



FRIDAY, JANUARY 16, 1880.

The Tay Bridge.

We give herewith an engraving of the Tay Bridge as it appeared after the fall of the thirteen spans. This engraving is copied from *The Engineer*. Both the original and the copy, it will be seen, have been prepared very hastily.

The accounts which *The Engineer* and *Engineering* of Jan. 2 publish make the nature of the failure more clear than it has been heretofore. The piers of the spans which have fallen consisted of a cylinder or caisson of wrought iron 31 ft. in diameter, which was built on shore and then floated into its position and sunk. It was first lined with brickwork, and, after being sunk, was filled with concrete. On this a pier of brickwork was constructed with a stone capping, the upper surface of which was 5 ft. above high-water mark. The plan of this was of hexagonal form, 27 ft. long in the direction of the stream and 15 ft. wide. On top of the stone capping, to quote from *Engineering*,

"was erected a pier composed of six cast-iron columns braced together, four of these columns being nearly vertical and placed under the girders, while the other two are cutwater columns. The two pairs of nearly vertical columns were 15 in. in diameter, and they were placed 9 ft. 10 in. apart from centre to centre through all their length in a direction transverse to the bridge, while in the other direction they were 12 ft. apart at the bottom and 10 ft. at the top. The two outer or cutwater columns were 18 in. in diameter,

a month or two ago, a friend of mine saw a model of a danger signal invented by an Englishman named Perrin, which, if report be true, so admirably answers its purpose that it is an impossibility for the engineer of any train to precipitate his cars into the river. The inventor, I believe, was in Chicago at the time on a visit, and if he has not yet left this country, possibly he may see this, and give your readers some information on this very important question. AN ENGINEER.

The Woodbridge Draw-Bridge Signals.

Office of the Hall Railway Signal Co.,
WEST MERIDEN, Conn., Jan. 10, 1880.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the account of the draw-bridge accident on the New Jersey Central Railroad at Woodbridge on Tuesday, 8th inst., it is stated "the mystery of the automatic signals showing contrary lights is not explained."

Inasmuch as I am the inventor and patentee of the automatic signals for draw-bridges, the statement that automatic signals were in use on the Woodbridge draw-bridge at the time of the accident would be very damaging to my system if allowed to go unexplained.

Will you, therefore, be so kind as to state in your next issue, first, if automatic signals were in use at the Woodbridge draw-bridge; second, if so, state by whom were they applied; third, explain the device and illustrate the same in the next issue of the *Railroad Gazette*.

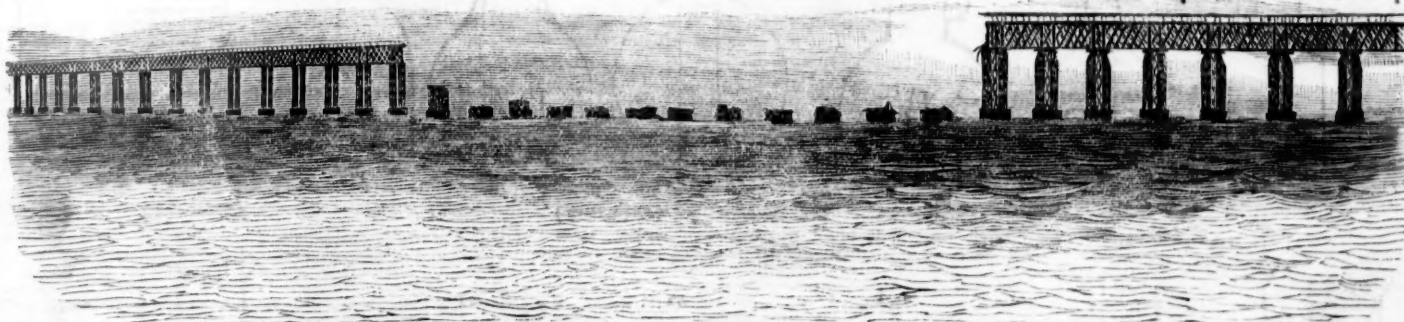
THOMAS S. HALL,
Inventor of the Hall System.

[The signals in use at the Woodbridge draw were the Toucey & Buchanan interlocking signals, and were

"2. The slow-up should not be substituted for the full-stop rule unless there is an efficient interlocking system of home and distant signals and the locomotive runners are at the same time subject to constant and rigid supervision at the point where the distant signals are located, or, in the absence of this, some effective appliance is added to the distant signals to remind the locomotive-runner of its position by an appeal to some other sense than that of vision."

Now, the Hall automatic interlocking system for draw-bridges is connected with the bolt that secures the bridge in position in such a way that the bridge cannot be moved without first showing a distant danger signal about 3,000 feet away, and also—what is of even greater importance—lowering a substantial obstruction, 1,500 ft. from the bridge, over the centre of the track, so that an engineer who disregards the distance signal, or who passes it just before the draw may be opened, will, at 1,500 ft. from the danger, have the smoke-stack thumped so severely as to call out his best efforts to stop the train. This "mechanical drop signal" is an effective means of preventing the "over-running of signals," to which you refer as being one of the most prolific causes of accident. Mr. C. F. Adams, Jr., says of my system, in his recent book on "Railroad Accidents," page 169: "So far as draw-bridges are concerned, the protection it affords is perfect. Not only is its interlocking apparatus so designed that the opening of the draw blocks all approach to it, but the signals are also reciprocal."

The reciprocal feature to which Mr. Adams refers is an apparatus by means of which an approaching train automatically causes a bell to ring in the bridge-tender's cabin, thus warning him not to open the draw; and also an apparatus, not automatic, by means of which the bridge-tender may set the distant signal at danger without withdrawing the bolt which secures the bridge, and thus stop an incoming



THE TAY BRIDGE.

and they were 21 ft. 10 in. apart from centre to centre at their basis, and 19 ft. 10 in. at their summits, each of these columns having a rake of 1 ft. only. Each column was made in seven 10 ft. 10 in. lengths united by flanges, horizontal bracing being introduced at each joint, and diagonal bracing between the lines of horizontal bracing. Each cutwater column was connected at its top to the adjoining pier of 15-in. columns by short girders on which the girders of the bridge took their bearing, but there was, we believe, no through transverse girder fixed to the tops of the columns. The columns were filled with Portland cement concrete."

These columns, which are represented by the small engraving, "appeared to have failed utterly," and, as shown by the larger engraving, "they are in most cases entirely cleared away, while in two instances there are still some broken stumps of the columns remaining on the stone work."

Regarding the force of the wind, the observations of Dr. Robert Grant, F. R. S., of the University of Glasgow, where a very complete series of meteorological observations have for many years past been carried on, are given in *Engineering* as follows:

"At 3 p. m. the hourly velocity of the wind was 24 miles, at 3:30 it was 42 miles, at 4 it was 42 miles, and at 4:20 it was 60 miles. At 6 p. m. the velocity was also 60 miles, but at 7:10 it reached 72 miles, and again at 8 p. m. there occurred a gust which brought the velocity up to 72 miles. This was the highest velocity attained, so far as could be indicated by our measures. I do not entertain the least doubt, however, but there occurred from time to time sudden gusts of wind which attained a velocity of 90 miles an hour. This is equivalent to a pressure of 40 lbs. on the square foot."

The Engineer says: "The bridge has not been overturned on its base, as some persons supposed, because of its height. The iron-braced columns have been broken across under a lateral strain, apparently due to the wind, and it is not difficult approximately to estimate the amount of that strain."

Engineering inclines "toward the hypothesis that the failure has been due to the insufficient resistance of the piers to lateral strain, the piers first giving way, and the superstructure then going over bodily."

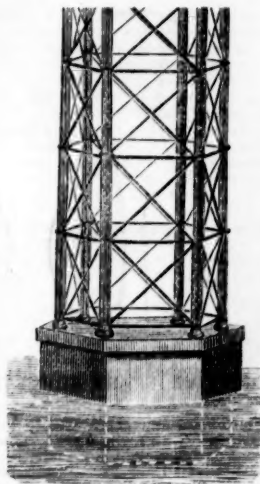
It will perhaps be idle to speculate further until a thorough investigation has been made by a court of inquiry, which, *Engineering* says, it is reported, will consist of Colonel Yoland, of the Board of Trade; Mr. Rothery, one of Her Majesty's Wreck Commissioners; and Mr. W. H. Barlow, the President of the Institution of Civil Engineers.

Contributions.

Danger Signals.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have been very much interested in the correspondence appearing in your journal on the subject of danger signals, and the practice of stopping trains prior to their passing over bridges, etc. We claim to be an ingenious nation, but I think it by no means creditable to our ingenuity that as yet no American has devised a signal adapted for this especial exigency. I ought to mention, however, that while in Chicago



not automatic. There was a distant signal 1,000 ft. from the bridge. It is still a disputed point whether a white or a red light was displayed from this at the time of the accident.

It is impossible in the time at our disposal to prepare illustrations of these signals. The system was, however, illustrated and described in the *Railroad Gazette* of Oct. 16, 1875.—EDITOR RAILROAD GAZETTE.]

Safety at Draw-Bridges.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The able manner in which you discuss the requisites of safety at draw-bridges in an editorial article in the *Railroad Gazette*, Jan. 2, deserves the attention of all who are interested in the subject, both among railroad men and the general public, although, as it appears to me, you are not familiar with the completest modern devices which insure absolute safety to trains without the expense and delay caused by bringing them to a full stop. By this I do not refer to systems only theoretically complete, but to those which have been in use for many years at two draw-bridges where there is probably the greatest amount of interference between river and railroad traffic in this country. You do, however, state correctly what a perfect signal system must not fail to accomplish before the full-stop rule may be safely abandoned, viz:

"1. No draw-bridge is safe without a signal which is interlocked with the bolt that secures or fastens the bridge in its position.

train in case of any obstruction other than that of an open draw.

Nearly ten years ago the Hall system was applied to the Harlem draw-bridge, and ever since then the immense combined traffic of the Hudson River, the Harlem, and the New York & New Haven roads has been carried over this point of danger, not only without accident, but also without observing the full-stop rule. It should be observed, too, that there is probably no draw-bridge in the United States, and possibly none in the world, which is opened so frequently—upward of one hundred and twenty times a day during some parts of the year.

As I intend sending you in a few days a more complete description and a full set of drawings of my draw-bridge system, I need not add more now.

THOMAS S. HALL,
General Manager of Hall Railway Signal Co.

Locomotive Spark-Arresters.

[Paper by J. Snowden Bell, read before the Franklin Institute at its meeting, Dec. 17, 1879.]

The spark-arrester, although one of the earliest of the numerous improvements which have contributed to the advancement of American locomotive engineering, has, as yet, failed to attain a degree of perfection commensurate with that of many constructive details of later origin. While from its earliest period to the present it has received continued attention, and has probably been the subject of more experiment and inventive effort than any other adjunct of the locomotive, the variations in the present practice, which will be obvious to even an unskilled observer, show clearly that the standard has not yet been arrived at. The boilers, frames, cylinder attachment and valve gearing of different builders have been reduced to uniformity in all substantial particulars, but there is a considerable range of difference in the construction of spark-arresters.

As preliminary to a review of the history and present development of locomotive spark-arresters it may be remarked, that to constitute a perfect one, there would be required a device which would offer no impediment to the draught, and at the same time completely bar the escape of unconsumed fuel from the stack. This has never yet been produced, and so far as the present system of locomotive boilers is concerned, doubtless never will be, the conditions being too directly at variance to render it possible for both of them to be satisfactorily complied with. Comparatively few of the results of the efforts made in this direction have survived the tests of practical operation, and it cannot be said of any of them that it is entirely free from objection, or so nearly adapted to the requirements of successful performance as to either merit or receive general acceptance as an approximately perfect apparatus.

The spark-arrester is peculiarly an American institution, and possesses but little practical value beyond that derived from American practice. Nearly twenty years ago a suit was brought against M. W. Baldwin & Co., the Philadelphia locomotive-builders, by David Matthew, for infringement of patents granted him for spark-arresters, and as a part of their defense, Messrs. Baldwin & Co. prepared a drawing showing 57 different forms of locomotive stacks and spark-arresters which had been used or patented prior to 1858. This drawing, which it is believed has never been

published, fully exemplifies the state of the art up to and at that time, and although, owing to the fact that the suit was not prosecuted, the dates of the different constructions shown were not authenticated by testimony, it will be found to possess much interest for those who may desire to investigate early practice in this direction.

The late Zerah Colburn, writing in 1860, says that the necessity for spark-arresters arose with the introduction of wood burning locomotives in 1830; and it is probable that about that time they were first applied, in the form of a wire netting cap placed over the top of the smoke-stack. The earliest record which we have been able to discover is the U. S. patent granted to James P. Espy, of Philadelphia, June 29, 1833, a description and illustration of which, accompanied by certificates of its successful performance, may be found in the *Journal of the Franklin Institute*, Vol. 12, new series, 1833, pp. 418, 421. Espy's "draft-generating chimney cap," as he termed it, was designed for steamboats as well as locomotives, and was merely a cap pointed or inclined at its front end and kept to the wind by a vane, in the manner of an ordinary chimney cap; its opening was covered by a sheet of fine wire gauze. Espy's cap is shown in Fig. 1. The specification states that it "affords a very free egress to the gases while it completely stops the sparks," and the engineer of Mr. Baldwin's locomotive engine (on the Philadelphia & Germantown Railroad) certifies that "with a wire gauze so fine that the head of a pin could not go through the meshes, which was quite too fine, it effectually stopped the sparks without diminishing the draft, and in

word, and thus prevent their passing through the wire bonnet, as well as preventing the bonnets wearing out too fast." Numerous unimportant variations of the bonnet pipe succeeded the original examples of Dripps and Rogers, and it reached its latest form, known as the "Yankee" stack, about 1841. As exemplified in the Mason engines of 1857 (Fig. 3), it is still extensively used for wood-burning engines, but in bituminous coal burners has given place generally to the modification usually termed the "diamond" stack (Fig. 4), in which the cone and netting are retained and the outer casing reduced in dimensions. The diamond stack, with various modifications of detail, is in use to a greater extent than any other at the present time.

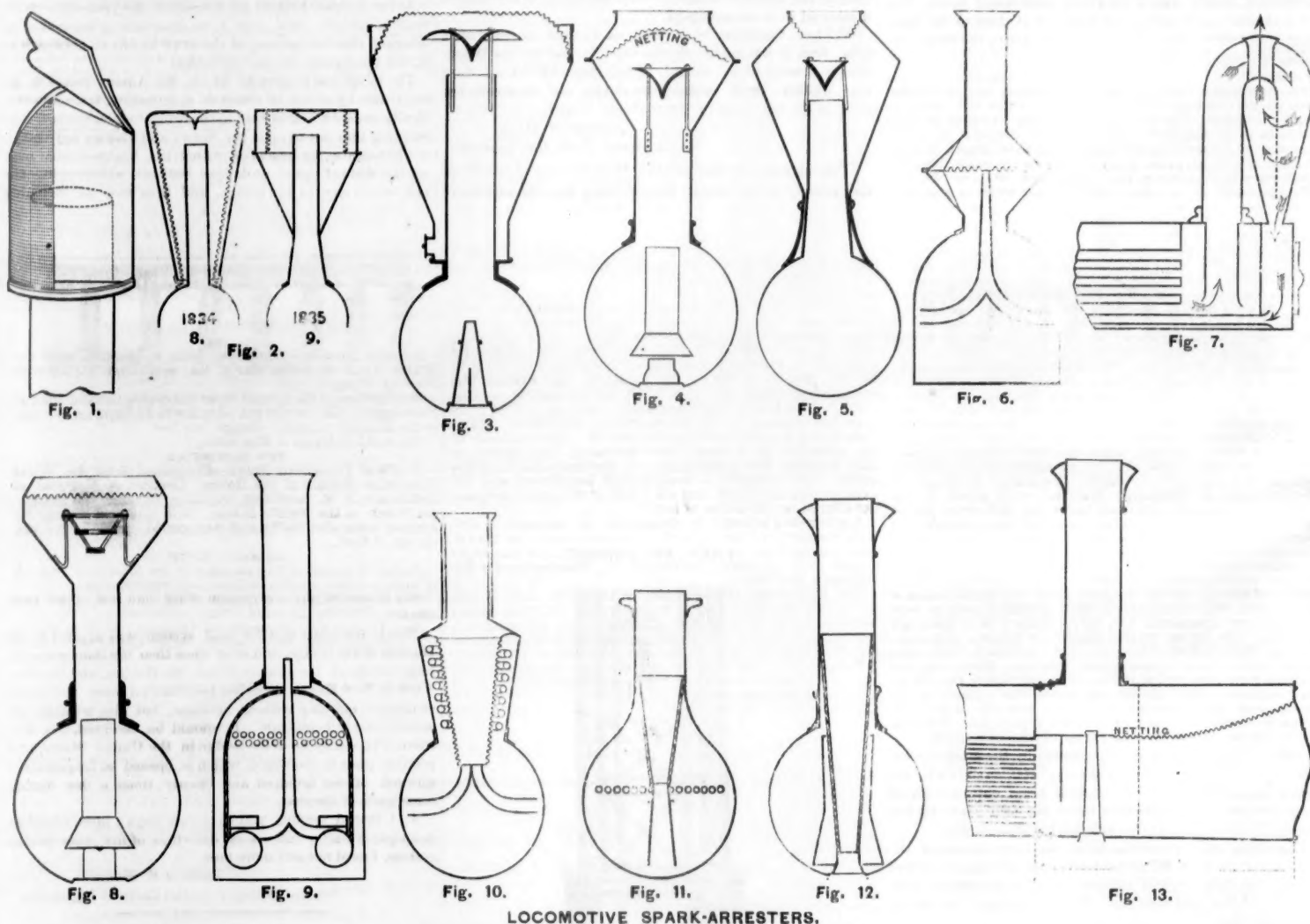
A form of the bonnet pipe patented in the United States by W. T. James, April 13, 1838, having a series of curved discharge passages under the central deflector (afterwards embodied in the French & Baird stack, 1842, and the Radley & Hunter, 1850), was adopted by constructors in Austria and Germany, and is shown in the drawing of the engines of the Semmering incline of the Vienna & Trieste Railway in 1852 (*Die Lokomotive der Staats-Eisenbahn über den Semmering*, Wien, 1854, Bd. XVI, XXI). In European treatises of much later date than the James patent, it will be found described as a German invention, and is termed "Klein's apparatus" (*appareil de Klein*). It was, moreover, patented in England by one Charles Cowper, in 1851, No. 13,705.

The principle of the bonnet pipe was preserved and employed under various modifications, from its conception by

through two short vertical discharge flues, while the cinders may be returned to the fire-box. This, like the Stevens stack of 1876, is substantially a reproduction of the principle of W. S. Montgomery's spark-extinguisher, patented July 28, 1838.

The Hughes spark-arrester (Fig. 8), patented Sep. 16, 1873, has been found to work well on anthracite coal burning engines. Its features are a deflector composed of a central disk with two separate rings of greater diameter above it, and an upper supplemental cone which can be adjusted in position to vary the draught.

In each of the several devices thus far referred to it will be noticed that the apparatus by which the sparks and cinders are to be separated from the smoke and gases is located in or connected with the stack. We shall now examine a different class, which, though not of recent origin, has of late years been revived and made the subject of strong claims as to its merit and utility, namely, that in which the separating and arresting apparatus is located either wholly or partially in the smoke-box. This we may not unreasonably expect to find as an adjunct to English practice, in which the adoption of American improvements has been more limited and tardy than on the Continent of Europe. The English patents of Samuel Hall, No. 8792, Jan. 14, 1841, and No. 9345, May 9, 1842, show the earliest smoke-box deflectors we have been able to discover; the same being in the form of a perforated metallic plate, passing around and above the front ends of the tubes, and having the exhaust pipe carried through it into a straight open stack, as shown



LOCOMOTIVE SPARK-ARRESTERS.

some cases it even increased it, as by opening the door to put in wood the flame did not come out as it did previously in similar circumstances." Notwithstanding these remarkable statements as to its virtues, which, upon this showing, were certainly very much superior to those of any we now know of, Espy's draft cap had but a brief existence, and is not even honored with a position in the Baldwin drawing before referred to.

Succeeding Espy's will be found several patented inventions, dating from 1834 to 1836, none of which came into use to any extent nor possess points that have been embodied in later practice. Passing these as merely unsuccessful speculations, we find the elements of the type of spark-arresters, which has met with most general acceptance in the United States, in the so-called "bonnet pipe," in which an inverted cone, turned downwards at its outer edge and placed over the mouth of the stack, deflected the sparks and cinders into a surrounding casing, while the smoke and gases escaped through a wire netting or "bonnet," covering the wide top of the outer casing. The invention of the bonnet pipe is claimed by Colburn for Wm. T. James, of New York, in an engine placed by the latter on the Baltimore & Ohio Railroad in 1833 (Recent practice in the Locomotive Engine, p. 59), but as exhibited in the Baldwin drawing, dates from 1834, and is to be credited to Isaac Dripps, then Master Mechanic of the Camden & Amboy Railroad; Nos. 8 and 9 of the drawing, which are here reproduced in Fig. 2, each showing a crude, although not impracticable, form of the combination of the deflector, netting, inside pipe and outer casing. Colburn (*The Engineer*, Philadelphia, 1860, p. 137) refers to "the cone and netting pipe made by Isaac Dripps in 1835, and patented by him in 1837." The latter statement is, however, erroneous, as no spark-arrester was patented by Mr. Dripps at that or any other time. Different forms of the bonnet pipe were patented by Duff (1837) and Briscoe (1838), and in "Locomotives and Locomotive Building," published by the Rogers Locomotive and Machine Works, 1876, it is stated (p. 9), referring to the engine "Sandusky," built by Rogers, Ketchum & Grosvonor, and first run Oct. 6, 1837: "The smoke-pipe was of the bonnet kind, having a deflecting cone curled over at the edges in its centre, so as to deflect the sparks down-

Dripps, in 1835, to the diamond stack of to-day, and among its various forms, one which found considerable favor, and is still in use, is that designed by John P. Laird for the Pennsylvania Railroad about 1864 (Fig. 5), in which the reduction of the size of the outer casing appears to be the distinguishing feature.

Returning to the order of dates, the next spark-arrester which, after the invention of the bonnet pipe, appears worthy of notice, is that of William Schultz, of Philadelphia, patented March 31, 1836 (Fig. 6). This may be described as in the form of the present diamond stack inverted, with its deflector removed and the exhaust nozzles passing through the netting. Schultz's stack was used on the Philadelphia & Columbia Railroad, and some of them were to be seen there up to the time that the road came into the possession of the Pennsylvania Railroad Company.

Longmire & Brooke, of Philadelphia, in 1840, proposed to prevent the escape of sparks from locomotives by carrying them into the ash-pan. Their plan contemplated extending the exhaust pipes downward into a flue passing horizontally under the boiler, into or below the ash-pan, "so as to cause the sparks, with the waste steam and the gaseous products of combustion, to be discharged into a compartment prepared therefor, or into the ash-pit, allowing their final exit to be downward, or on toward the ground." It is probably needless to state that if this apparatus worked on paper it would not on a railroad, and it has not, like some other impracticable suggestions, been periodically re-invented. In the latter respect, however, it differed from the "spark-extinguisher" of David Ritter, patented Nov. 26, 1840, which is noticed here only for the benefit of the inventor who may be so unfortunate as to develop the idea that he can carry the sparks and cinders through a horizontal pipe leading from the stack over the top of the train and discharge them at the rear end. Numerous patents have been granted, since that of Ritter, for inventions embodying the same principle, none of which appear to have made any practical record.

In the Farrand spark-arrester, patented Aug. 19, 1873, which is shown in fig. 7, the cinders are claimed to be separated by curving the top of the stack forward and downward into a chamber from which the smoke and gases escape

in fig. 9. A horizontal perforated deflector placed across the smoke-box above the top row of tubes, as used by Hovey and others in the United States in 1863, was patented in England by Wm. Geo. Beattie, March 5, 1864, No. 559.

In the Baldwin drawing of 1860, the sketch numbered 45, representing a construction of Eastwick & Harrison, of Philadelphia, dated 1840, shows a cylinder of wire netting connecting the series of separate exhaust nozzles with the bottom of the inside smoke-stack; about one-half of the cylinder being located in the smoke-box. The usual upper netting or bonnet extends over the top of the outer casing. We can find no record of the performance of this apparatus, which probably failed by reason of offering too great an impediment to the draught.

R. A. Wilder, Engineer and Superintendent of the Mine Hill & Schuylkill Haven Railroad, next appears in this category, as the inventor of a perforated truncated cone of wire netting, extending from the nozzles of the exhaust pipes to a point above the base of the stack, and designed to intercept the sparks and cinders while giving passage to the lighter products. This he patented in 1864, in a combined feed-water heater and spark arrester, which was used on the anthracite coal burning engines of the Mine Hill & Schuylkill Haven and other roads. An illustration and description of the Wilder stack will be found in the *Journal of the Franklin Institute*, vol. 33, 3d series, 1857, p. 414, and it is shown in the accompanying fig. 10, as applied to the Baldwin eight-wheel connected engine, "No. 29," of the Mine Hill road, from an article upon which, by Colburn, in *The Engineer* (Philadelphia), of Oct. 18, 1860, p. 77, we make the following extract, which clearly describes it:

"The smoke-box is made of $\frac{1}{2}$ -in. iron, and supports a heater, spark-arrester and chimney of peculiar construction. A tapering pipe, of coarse wire cloth, 21 in. in diameter at the top, 10 in. at the bottom, and 3 ft. 6 in. high, descends 10 in. below the top of the smoke-box. The exhaust pipes, with nozzles $\frac{3}{4}$ in. each, come up to and enter the bottom of this pipe, which is otherwise closed by a plate of perforated iron. The heated air and sparks ascend around this netting pipe, which is surrounded at a distance of 6 in. by an outer casing of stiff iron, and which is thus about 38 in. in diameter at the top, 30 in. high above the smoke-box and

24 in. diameter at the bottom. The fine coal carried through the tubes is thrown down by the meshed sides of the netting pipe, the products of combustion passing through and up through a straight open pipe 14½ in. in diameter. * * * The spark-arrester has been described, but it should be said that the fine coal and sparks thrown down by the nearly vertical sides of the wire-netting pipe, drop through a large opening in the bottom of the smoke-box, and into a large iron spark-box beneath. This box is cast very heavy, and is really the bed-plate of the cylinders, broad flanges on which are strongly bolted to its sides. In the bottom of this spark-box or hollow bed-plate is a valve through which its contents may be discharged at pleasure upon the track."

Wilder's engines had long exhaust pipes and no draft or lift pipes, as in the universal English practice, and a perforated cone, identical in principle with his, was patented in England by W. G. Beattie, March 5, 1864, No. 559, and C. Moriarty, Sept. 10, 1864, No. 2,219, the latter forming his of "stretcher rods" of iron wire instead of the usual netting. Beattie's cone is shown in fig. 11.

E. May, of Boston, patented a cylinder of wire netting, extending from the exhaust pipes to the stack, July 28, 1857, and A. S. Sweet, Jr., of Detroit, patented double cylindrical deflectors on a similar principle June 23, 1863, after which nothing more appears to have been done in this direction until 1870, when the Wilder perforated cone, "in combination" with the ordinary American draft pipe, used for a long time theretofore with short exhaust nozzles, was again patented in the United States by James Smith, and has been adopted as a standard for their passenger engines by the Pennsylvania Railroad Company, using both anthracite and bituminous coal, and by several other roads burning anthracite exclusively. Fig. 12, from "The Pennsylvania Railroad," by James Dredge, London, 1879, shows the Smith stack as used on the Pennsylvania Railroad and branches.

The perforated cone possesses, in principle, no advantage over the diamond stack, beyond the possibility of obtaining a larger amount of separating surface, and so far as the use of bituminous coal is concerned, the Smith spark-arrester does not, in practice, exhibit any material reduction in the amount of cinders and sparks expelled, as compared with a bonnet or diamond stack of the average construction.

Our history may be closed with a notice of the Hovey spark-arrester, the latest form of which has been within a few years past introduced on the New York & New Haven Railroad, and the distinguishing characteristic of which is a longitudinal extension of the smoke-box, to form a spark receptacle, and the use of deflectors between the tube ends and lower opening of the stack. A smoke-box extended forward of the stack was patented, as a spark-arrester, by John Thompson, of Boston, May 29, 1860, upon the theory that the sparks would "pass out of and beyond the current of smoke, so as to be deposited in the box by the action of gravity and not carried up the chimney." A very brief consultation with any experienced locomotive fireman might have led Mr. Thompson to the knowledge that sparks will not behave in this accommodating manner, and an investigation of authorities on boiler engineering would have taught him the fallacy of increasing the dimensions of the smoke-box where economy in the consumption of fuel is to be kept in view. His plan never received acceptance, from its manifest impracticability, but an attempt to improve it was made by Jacob Hovey, at the time Master Mechanic of the Cleveland & Pittsburgh Railroad, who added to the Thompson extended smoke-box horizontal deflectors, placed above the upper row of tubes, patented the arrangement April 7, 1863, and placed it upon a number of engines on the Cleveland & Pittsburgh Railroad. The accounts of its performance on that road were eminently unsatisfactory, engines failing for steam, and smoke-boxes sometimes becoming red-hot in parts from the ignited cinders with which they were partly filled, and the apparatus was permanently abandoned by the Cleveland & Pittsburgh Railroad. Since the early and unsuccessful efforts of Hovey, the extended smoke-box system has, from time to time, been taken up by other parties, and has culminated in the arrangement adopted by the New York & New Haven Railroad, shown in fig. 13, in which a vertical sheet-iron deflector is placed at a distance of about nine inches in front of the flue head, and extends to a point about twelve inches above the bottom of the smoke-box. This deflector is perforated only for a short distance above its lower side, and a horizontal imperforate deflector extends from the flue-head to a point a few inches in advance of the long exhaust nozzle which passes through it. A sheet of wire netting extends from the front of the horizontal deflector to or near the front end of the smoke-box, the interstices of which netting form the exit openings for the products of combustion passing to the stack.

R. Hill, in 1873, patented a vertical imperforate deflector and netting in the ordinary smoke-box, and S. A. Hodgman, in 1874, a perforated plate in front of the flue-head, with a binged damper on its lower side. The employment of Hill's deflector, which has been embodied in the extended smoke-box arrangement, as shown in fig. 13, is apparently advantageous, and if such a deflector was combined with a smoke-box of normal dimensions and a spark-arresting stack, all the benefits of the extended smoke-box plan, if any there are, would be retained. Such an arrangement, however, does not appear to have been put in practice, and in the only use that has so far been made of the deflector, its value is practically destroyed by the faultiness of a construction with which it has no legitimate connection.

From the preceding retrospect of the history of the locomotive spark-arrester, in which we have attempted to sketch merely a few leading features which have characterized its progress from its primitive form, that of grating or netting placed over the top of the stack, to the present practice, the latter may be divided into three general classes: The bonnet pipe, as modernized into the diamond stack; the Wilder perforated cone, and the extended smoke-box with its inside deflectors. Each of these has its advocates, and each is sufficiently open to objection to demand a continuance of experimental research by designers and constructors of locomotives. The defects of the first two systems are those which are inseparable from the impossibility of reconciling perfectly the two directly conflicting conditions which necessarily obtain in any and every spark-arrester, but those of the third embrace in addition a radical error of principle and practical disadvantages which combine to more than neutralize any merit it may be claimed to possess. In the formation of this opinion the writer has been governed as well by the dicta of acknowledged authorities as by his own observation of the operation of the long smoke-box, and if the expression of his views should succeed in eliciting evidence that he is incorrect, another step will have been attained toward directing the efforts of locomotive engineers to produce a practically perfect spark-arrester, in the channel which leads to success.

The error of principle alluded to lies in *expanding* the capacity of the smoke-box, the dimensions of which, in the ordinary construction, are too great. In support of this proposition there can be adduced the opinions of Zerah Colburn and Daniel Kinnear Clark, both of whom were engineers so eminent, as well in practice as in theory, that their writings have received general acceptance as standard authority on questions relating to locomotive engineering. From an article by Colburn, on "Proportions of Locomotive Boilers,"

published in the journal of the Franklin Institute, Vol. 27, 3d series, 1854, pp. 194-199, we make the following quotations:

"Another means of improving the working of locomotive boilers is in forming a better connection of the tubes and chimney than is afforded by the ordinary 'smoke-box.' The direction of this passage must be eased, and its contents reduced to the smallest possible extent. The use to which the upper part of the smoke-box is generally placed has prevented the separation of that part from the general contents of this chamber. The steam pipes and throttle box, for the want of a better situation, have been placed here, and often in such a manner as to stand in the way of the draft. A plan which I proposed some time since for the relief of the draft of engines on a line having low bridges, which plan I have lately learned was tried with good results some years since on the Columbia road, but for some reason was not continued in use, was to place a level sheet of iron across the smoke-box just above the upper row of tubes. This would reduce the contents of the smoke-box and consequently the amount of air to be lifted out. It would allow of extending the chimney downward, and of thereby increasing the effective length, and also of lowering the blast pipes and substituting blast pressure for blast suction. I look to this plan as one likely to become generally applied."

The views of D. K. Clark are to the same tenor, and he verifies them by results obtained from actual experiment with engines in England. ("Railway Machinery," London, 1865, p. 137.)

The soundness of the principle enunciated by Colburn, and the adoption of the plan he proposes are further attested by the French engineers Le Chatelier, Flachet, Petiet and Polonceau. In their treatise, the *Guide du Mécanicien Constructeur et Conducteur de Machines Locomotives*, Paris, 1859, under the head "Boîte à fumée" (smoke-box) they say, on pages 113 and 114: "The dimensions of the smoke-box should be, on principle, as limited as possible, for the immediate effect of the draught produced by the exhaust is to dilate the air comprised in its capacity; this rarefaction being operated by reason of the diminution of pressure which is the consequence of the draught, the hot gases which fill the tubes, and after them those which fill the fire-box, rush into the smoke-box to give place to the fresh air which the difference of pressure causes to pass through the grate and fuel. It is evident that for the same action produced by the exhaust of the steam in the chimney, the dilatation will be as much greater in the smoke-box as the volume of the latter is smaller, and, as a consequence, the suction of air through the furnace will be more energetic. It appears, nevertheless, that there is in practice a limit to this reduction of the dimensions of the smoke-box, below which it ceases to be advantageous. One of the best means of causing this reduction consists in placing a horizontal plate above the upper row of tubes and lowering the chimney to this plate, which is fastened by angle-iron to the vertical surfaces of the smoke-box. (Pl. 9, fig. 2.) Mr. J. J. Meyer, of Mulhouse, has applied this arrangement since the year 1845 to locomotive engines ordered from him by the Austrian Government, which in its turn has adopted it for the remainder of its stock. Many French constructors have also adopted it. Independently of the reduction of volume, there are many advantages in thus isolating the upper portion of the smoke-box from the lower. The chimney is considerably lengthened, and the exhaust pipe shortened, and the joints of the steam pipes are not altered by the action of heat."

A smoke-box reduced in dimensions as proposed by Colburn is shown in Plate xlii. of "Recent Practice in the Locomotive Engine," London, 1860, representing a passenger engine built by Sharp, Stewart & Co., Manchester, for the Egyptian Railway.

The authorities cited merit consideration, and it can scarcely be maintained upon mere assertion that the position assumed by them upon this question is an erroneous one, especially as it accords with the universal practice in marine and stationary boilers, as well as with that of all locomotive-builders in this country and Europe, except the comparatively small number here who have adopted the extended smoke-box arrangement.

The practical disadvantages of the extended smoke-box are, in addition to greater cost of construction and maintenance, the increase of weight which it throws upon the truck, and the necessity of cleaning it at the end of the trip. Accurate data as to the percentage of unconsumed coal which passes out of the front end of the tubes of a locomotive cannot probably be obtained, but is obviously a large one. In a report on the tests of a Baldwin 16×24-in. engine, on the Cincinnati, Hamilton & Dayton Railroad, made by John W. Hill, M.E., and published in the *Journal of the Franklin Institute*, April and May, 1879, Mr. Hill states that of the coal charged per foot of grade not less than twenty per cent. must have been blown unconsumed out of the stack, and adds: "The facility with which a locomotive boiler operating under a strong blast can distribute unburnt coal along the track is well known, but it is doubtful if the percentage of coal thus disposed of is equally well known. Under the ordinary conditions of locomotive performance, with careful firing and regular blast, the loss of coal by this avenue is, in the writer's opinion, rarely less than five per cent." As another estimate, it may be added that in the specification of a recent patent to a locomotive-builder, the statement is made that there is "a waste of fuel amounting to nearly 55 per cent., caused by the too rapid passage of the products of combustion through the tubes and by the premature escape of unconsumed fuel in the condition of gases and ignited sparks."

Whatever the actual average percentage may be, it is clear that it would be impossible for an extended smoke-box, even when exaggerated, as in some instances, to the length of seven feet, to contain all the sparks and cinders which escape from the tubes during the ordinary run of a passenger engine, and therefore they must, with the exception of those which at the commencement of the trip bank up in the front end and are transported uselessly, be driven through the netting and out of the stack. No advantage, either theoretical or practical, appears in this method of expulsion over that practiced with the bonnet pipe or the perforated cone, and the objections, both of principle and in practice, are too undeniable to be explained away by the vague assertion that the arrangement is "cleaner" than the former ones.

If the position herein taken, that the extended smoke-box is a departure from sound theory and progressive practice, be a correct one, the length at which strictures upon it have been presented will be neither objectionable nor devoid of value; and, if not, it is evident that the only other systems of spark-arresters which still remain to any extent in use, namely, the bonnet pipe and the perforated cone, should be relegated to the past, and the improvement of the extended smoke-box arrangement be recognized as the single avenue to success for all those whose endeavors are directed toward the perfection of this department of locomotive engineering. —*Journal of the Franklin Institute.*

—Mr. A. H. Fracker has resigned his position as Superintendent of the North Penn & Bound Brook Division of the Philadelphia & Reading road. Mr. Fracker has been connected with the North Pennsylvania road for many years.

Record of New Railroad Construction in the United States in 1879.

We give below our usual yearly record of the new railroads completed in the United States. In it we have aimed to include all new railroad on which track was laid during the calendar year, whether opened for business or not, but not second track and sidings. The information obtained during the year has been supplemented and corrected by extensive correspondence and personal inquiry, by which a very large amount of additional information has been secured. But we cannot flatter ourselves that the record as it stands is complete or entirely accurate. Every year we discover some new road not previously recorded, and also sometimes the non-existence of some road which had been reported as built. But very great pains have been taken with this record, and the list must be very nearly complete and generally accurate. As always, we will be glad to be notified of any errors or omissions which our readers may discover, whether of name of road, time of construction, length, gauge, direction, terminal points, or otherwise. All such corrections will be made use of in a supplementary statement or in the statement of the totals in future years.

We preface this record with the following correction of the record for 1878 which we published April 25, 1879 (page 226):

In *Mississippi the Mobile & Northwestern* 3-ft. gauge road was extended 8 miles eastward to Jonesville, making it 16 miles long from the Mississippi River opposite Helena, Ark. In *Texas* the first 12 miles of the *Central & Montgomery* was completed, from the Houston & Texas Central at Nava-sota east to Plantersville.

In *Ohio* 12 miles of track were laid on the *Columbus & Maysville* road (3-ft-gauge) from a junction with the Cincinnati & Eastern at Sardinia northward.

In *Missouri* the *St. Louis, Hannibal & Keokuk* was extended from Bowling Green southward 15½ miles to Prairieville.

In *Colorado* the *Denver, South Park & Pacific* (3-ft. gauge) was extended 10 miles further than we reported, to Webster.

In *Utah* the first 14 miles of the *Utah & Pleasant Valley* Railroad (3-ft-gauge) were completed, from Provo southeast.

This is an addition of 71½ miles, less 4 miles improperly credited, making the total, for 1878, 2,916 miles of new railroad.

NEW CONSTRUCTION IN 1879.

MAINE.

Norway Branch.—Completed from a junction with the Grand Trunk at South Paris, Me., southwest 2½ miles to Norway Village.

Sandy River.—Completed from the Maine Central road at Farmington, Me., westward 18 miles to Phillips, on the way to the Rangeley Lakes. Gauge, two feet.

The total in Maine is 20½ miles.

NEW HAMPSHIRE.

Profile & Franconia Notch.—Completed from the White Mountains Branch of the Boston, Concord & Montreal at Bethlehem, N. H., southeast, 9½ miles, through the Franconia Notch to the Profile House. It is intended chiefly for summer excursion traffic, and was opened for traffic in June. Gauge, 3 feet.

MASSACHUSETTS.

Boston & Lowell.—An extension of the Lawrence Branch ½ mile to a new station in Lawrence was completed.

Middlesex Central.—A branch of this road 3 miles long was completed to the State Prison in Concord.

New York & New England.—A branch of the Woonsocket Division was completed to Baker's Ridge Hill Farm, a resort of excursionists, in the town of Wellesley. It is 1.6 miles long.

The total in Massachusetts is 5 miles.

NEW YORK.

Boston, Hoosac Tunnel & Western.—The road was completed by the laying of track from Eagle Bridge, N. Y., southeastward across the southwest corner of Vermont to the north line of Massachusetts, 18 miles, making the whole road 39 miles long, from a junction with the Troy & Greenfield road at the Massachusetts line a few miles from North Adams northwest, and west to a junction with the Rensselaer & Saratoga, at Mechanicsville; which gives it a connection with the Troy and Albany, and, through the Albany & Susquehanna road, with the Erie. To make the connection between the Erie and Boston and New England is the chief object of the road. Of the 18 miles built this year, 6½ are in Vermont.

Chateaugay.—Extended from the terminus of the Dannemora Railroad at Dannemora, N. Y., westward 17.3 miles to the Chateaugay iron mines at Mt. Lyon. Gauge, 3 ft. The proprietors of it have leased the Dannemora road from the state, and the two together make a line 40 miles long from Plattsburg northwestward.

Jersey City & Albany.—Extended from Tappan town N. Y., northward 16 miles to a point two miles from Haver straw, making the road 34 miles long from Jersey City northward. It is worked at present by the *New Jersey Midland*.

Lockport & Buffalo.—Completed by an extension of 7 miles into Lockport, N. Y., making it 18 miles long from Tonawanda northeast to Lockport. It was leased Sept. 15 to the *New York, Lake Erie & Western*.

Metropolitan Elevated.—This company completed an elevated railroad (all but a quarter of a mile double track) from Fifty-third street and Ninth avenue, in the city of New York north in Ninth avenue to One Hundred and Tenth street, thence west to Eighth avenue, and thence in Eighth avenue north to the Harlem River at One Hundred and Fifty-fifth street, a distance of nearly 5½ miles. A longer line on the east side of the city was nearly completed, but the track not laid.

New York & Sea Beach.—Some three miles of this Coney Island excursion railroad, from the island northwestward, were completed in 1876. Last year it was finished by an extension three miles further west to New York Bay at Bay Ridge, whence steamboats connect it with New York city in the summer season.

New York City & Northern.—This company completed the line graded by the bankrupt *New York, Boston & Montreal* from the Harlem River at High Bridge (New York city) northward 51 miles to Brewsters, N. Y. Several miles of track at both ends were laid in 1873, and the new track is 26 miles long.

Prospect Park & Coney Island.—A branch, was built from the Coney Island terminus west 1½ miles to Coney Island Point, to connect with a steamboat landing.

Rochester & Lake Ontario.—Completed from Rochester, N. Y., northeast 6 miles to Sea Breeze, on Irondequoit Bay. It is intended chiefly for excursion traffic, and was opened early in August.

The total in New York is 93½ miles.

NEW JERSEY.

Delaware Bay & Cape May.—Completed from Cape May,

N. J., northwest 4 miles to Cape May Point. It is worked in connection with the West Jersey Railroad.

New Jersey Southern.—The *Tom's River Branch* was extended from Barnegat Junction southward about 2 miles to the village of Barnegat, N. J.

The total in New Jersey is 6 miles.

PENNSYLVANIA.

Mont Alto.—Extended southward 1½ miles to Waynesboro, Pa., making it 18½ miles long from its junction with the Cumberland Valley road 3½ miles from Chambersburg.

Montour.—Completed from junction with the Pittsburgh & Lake Erie Railroad at Middletown, Pa., up Montour Run 3 miles to some coal mines.

Philadelphia & Reading.—A new connecting line 1½ miles long was completed between Wayne station on the Germantown Branch and Tabor station on the leased North Pennsylvania, especially to enable the New York-Philadelphia trains of the latter road use the conveniently situated station at Ninth and Green streets in Philadelphia.

In April a branch 2½ miles long was completed from Harrisburg to the Pennsylvania Steel Works at Baldwin, Pa.

Pittsburgh & Lake Erie.—Early in the year the *New Castle Branch* was completed from the main line near Mahoningtown northward to New Castle, Pa., 3 miles.

Pittsburgh & Western.—At the southern end this road was extended from Etua eastward 5 miles into Allegheny City, making the line 85 miles long from Allegheny to Zelenople. Gauge, 3 feet. An extension 30 miles long from Zelenople to Wurttemberg was all graded; but track was not laid.

The total in Pennsylvania is 16½ miles.

MARYLAND.

Baltimore & Hanover.—Extended from Maple Hill, Ind., southward 12 miles to a junction with the Western Maryland at Emory Grove, making it 20 miles long from its junction with the Bachman Valley road at Black Rock. It was built in the interest of the Hanover Junction, Hanover & Gettysburg Company.

Pennsylvania Railroad in Maryland.—Completed from State Line, on the Bedford Division of the Pennsylvania Railroad, southward 6 miles to Cumberland, Md., making the Bedford Division 45 miles long from the junction with the Huntington & Broad Top Railroad at Mt. Dallas, and 90 miles from the junction of the latter road with the Pennsylvania's main line at Huntington.

Western Maryland.—The *Baltimore & Cumberland Valley Railroad* was built for this company from the Western Maryland at Edgemont, Md., northwest 3 miles to the Pennsylvania line. Grading was completed 4½ miles further, to Waynesboro, and the rails for this portion are on the ground. The road is intended to open a new route between Baltimore and Harrisburg.

The total in Maryland is 21 miles.

VIRGINIA.

Norfolk & Ocean View.—This is a light suburban road which was completed in September from Norfolk, Va., north 8 miles to a seaside resort at Ocean View, opposite Fortress Monroe.

Shenandoah Valley.—Extended from the north line of Clark County, Va., southwestward 25½ miles to Riverton, on the Virginia Midland Branch, making the road 45 miles long from the Potomac River at Shepherdstown.

The total in Virginia is 33½ miles.

NORTH CAROLINA.

Cape Fear & Yadkin Valley.—This company (formerly the Western of North Carolina) has extended its road from Egypt, N. C., northwest 4 miles to Gulf, making it 47 miles long from its eastern terminus on the Cape Fear River at Fayetteville. The extension was opened in March.

Spartanburg & Asheville.—Extended from Flat Rock, N. C., northward 6 miles to Hendersonville, making the road 48 miles long from Spartanburg, S. C., northwestward. Gauge, 5 ft.

Western North Carolina.—Extended from Swannanoa Tunnel westward 9 miles into Buncombe County, making the road 136 miles long from Salisbury westward.

The total in North Carolina is 19 miles.

SOUTH CAROLINA.

Chester & Chester.—Extended from Fishing Creek, S. C., eastward 5 miles to Catawba River, making the road 22½ miles long from Chester east. Gauge, 3 ft.

GEORGIA.

Cherokee.—Extended from its old terminus at Rockmart, Ga., southwest 13 miles to Cedartown, making the road 37 miles long from its junction with the Western & Atlantic at Cartersville. Gauge of the extension, 3 ft. The first 14 miles of the road are of 5 ft. gauge.

Columbus & Ohio.—This company, the successor of the *North & South of Georgia*, extended its road during 1879 from Kingsboro north 7½ miles to a point 3½ miles north of the stations at Hamilton, Ga., making the road 27½ miles long from Columbus northward. Gauge, 3 ft.

Hartwell.—Completed from a junction with the Elberton Air Line Railroad at Bowers, Ga., eastward 16 miles to Hartwell. Gauge, 3 ft.

Louisville Branch.—Completed from a junction with the Central Railroad at Wadley, Ga., northward 10 miles to Louisville, Jefferson County. It is worked as a branch of the Central. Gauge, 5 ft.

Marietta & North Georgia.—Extended northward 13 miles to Canton, Ga., making the road 23 miles long, from Marietta. Gauge, 3 ft.

The total in Georgia is 59½ miles.

FLORIDA.

Peninsular.—Completed from a junction with the Atlantic, Gulf & West India Transit Railroad at Waldo, Fla., south 20 miles to Lockloosa Landing on Orange Lake, where a steamboat connects with it for other lake landings. Gauge, 5 ft.

St. John's & Lake Eustis.—Track was laid from the St. John River at Astoria, a few miles above Lake George, southwestward 12 miles, the grading being mostly done to Lake Eustis, about 14 miles further. Gauge, 3 ft.

The total in Florida is 32 miles.

ALABAMA.

Selma & Greensboro.—Extended from its late eastern terminus at Marion Junction, Ala., southeast 7 miles to a junction with the New Orleans & Selma Railroad at Salt Marsh, making the road 42 miles long to the western terminus at Greensboro. The new line enables it to enter Selma over the New Orleans & Selma instead of the Alabama Central Railroad. Gauge, 5 ft.

MISSISSIPPI.

Mobile & Northwestern.—We have information that this company laid 8 miles of track in 1877 and 8 more in 1878 (none of which we reported in those years), completing a line 16 miles long from the Mississippi at Glendale (opposite Helena, Ark.), southwest to Jonesville, Miss. In 1879 track was laid 12½ miles further; and the road was ready for the rails, which were to be laid in a few days, 1½ miles further, to Clarksdale. Gauge, 3 ft.

LOUISIANA.

Louisiana Western.—This road, which is to extend Morgan's Louisiana & Texas road from Vermillionville west, across the state of Louisiana to Texas, was completed from Lake Charles, La., 9 miles west and 18 miles east (in Louisiana), and from Orange, Tex., northeast up the west side of the Sabine River (in Texas) to the crossing of that stream, 7 miles. Nearly all the rest of the road (Orange to Vermillionville) 102 miles, is very nearly ready for the rails, which will be laid very soon.

Morgan's Louisiana & Texas.—Extended from the late terminus at Morgan City, La., north-westward 45 miles to New Iberia, and graded 18 miles north to Vermillionville, whence the *Louisiana Western* is to continue it to Texas. This makes the road 125 miles long, from the Mississippi, opposite New Orleans, to New Iberia.

The total in Louisiana is 72 miles.

TEXAS.

Central & Montgomery.—A section of this road from the Houston & Texas Central at Navasota, Tex., eastward 12 miles to Plantersville was completed in 1878, but not included in our list for that year. In 1879 it was completed 13 miles further east to Montgomery, and opened in December.

Corpus Christi, San Diego & Rio Grande.—Extended from the 1878 terminus at Collins, Tex., westward 13½ miles to San Diego, making the road 53½ miles long from the eastern terminus at Corpus Christi. Gauge, 3 ft.

Denison & Pacific.—Extended from Whitesboro, Tex., west by south 15 miles to Gainesville, making the road 40 miles long from its junction with the Missouri, Kansas & Texas at Denison.

Galveston, Harrisburg & San Antonio.—This road has begun a line eight miles long from Pevice Junction northeast to Houston, which will virtually change the eastern terminus of the road from Harrisburg to Houston. On this line 3½ miles of track were laid at the end of 1879.

Gulf, Colorado & Santa Fe.—Extended from Richmond, Texas, northwest 30 miles to Sealy, in Austin County, making the road 94 miles long from Galveston northwest. The extension was completed to Sealy, Dec. 23. The road-bed is nearly ready for the track 63 miles further, to Caldwell, in Burleson County, and it is intended to extend it 63 miles still further by next summer, to a point in Bell County 225 miles from Galveston. The road is nearly parallel with and generally not more than 20 miles west of the Houston & Texas Central.

Houston & Texas Central.—The *Waco & Northwestern Branch* was extended from Ross (11 miles beyond Waco), northwestward 21 miles to Whitney, making the branch 64 miles long from the junction with the main line at Brennon. The extension beyond Ross is made by the *Texas Central* Company. About 30 miles beyond Whitney were very nearly completed at the close of the year.

Houston, East & West Texas.—Extended northwestward 11 miles, to Trinity River, making the road 61 miles long from Houston north by east. Gauge, 3 feet. An extension of 27 miles is in progress.

Texas & St. Louis.—Completed from Texarkana, Texas, southwest 90 miles to Sulphur Fork. The company has absorbed the old Tyler Tap road, 21 miles of which, from Ferguson to Tyler, have been in operation two or three years. Work is progressing on the line between Sulphur Fork and Ferguson. Gauge, 3 feet.

Waxahachie Tap.—Completed from a junction with the Houston & Texas Central at Ennis, Tex., westward 12 miles, to Waxahachie.

Seven miles of the *Louisiana & Western*, given under Louisiana, are also in Texas, and its total is 156 miles.

ARKANSAS.

Cotton Plant.—Completed from a junction with the Memphis & Little Rock road at Brinkley, Ark., northward 11 miles to Cotton Plant. It is owned by the firm of Gunn & Black, lumber manufacturers. Gauge, 3 ft. 6 in.

Iron Mountain & Helena.—Track was laid from the junction with the Arkansas Midland at Bushville, 10 miles west of Helena, Ark., northwest 12 miles to a point 2 miles beyond Lagrange. The grading was done to Marianna, 6 miles further. Gauge, 3½ ft.

The total in Arkansas is 23 miles.

TENNESSEE.

Cincinnati Southern.—The track was completed Dec. 9 from Cincinnati to Chattanooga, 336 miles, the part laid in 1879 being the 173 miles from Somerset, Ky., southward to the junction with the Western & Atlantic at Boyce's, 5 miles from Chattanooga, for which distance the latter road's track is used. Of the extension, about 43 miles are in Kentucky and 130 in Tennessee.

Duck River Valley.—Extended from Lewisburg, Tenn., southeast 14 miles to Petersburg, making the road 34 miles long from its junction with the Nashville & Decatur line of the Louisville & Nashville at Columbia. Gauge, 3 ft.

Nashville & Tuscaloosa.—Completed from a junction with the Nashville, Chattanooga & St. Louis at Dickson, Tenn. (40 miles west of Nashville), southward 21 miles to Graham. Gauge, 3 ft.

The total in Tennessee is 165 miles.

KENTUCKY.

Cumberland & Ohio.—The *Louisville & Nashville* Company extended the *Southern Division* of this road southwestward 24 miles to within 1½ miles of Greensburg, Ky., making it 29 miles long from the junction with the Louisville & Nashville at Lebanon.

With the 43 miles of the *Cincinnati Southern* (given under Tennessee) which are in Kentucky, this makes 67 miles of new railroad in the state.

WEST VIRGINIA.

Clarksburg, Weston & Glenville.—Completed from the Baltimore & Ohio at Clarksburg, W. Va., southward 25 miles to Weston. Gauge, 3 ft.

OHIO.

Bellaire & Southwestern.—Extended from Jacobsburg, O., in a general southwesterly direction, by a very crooked route, to Woodsfield, 29 miles, making the whole length of the road from Bellaire 42 miles. Gauge, 3 ft.

Celina, Van Wert & State Line.—Completed from a junction with the Toledo, Delphos & Burlington north 7½ miles to Van Wert, on the Pittsburgh, Ft. Wayne & Chicago. Gauge, 3 ft.

Cincinnati & Eastern.—The *Ohio River Branch* was extended southward 2 miles to Blairville, O.

Columbus & Maysville.—Extended northward 7 miles past a junction with the Marietta & Cincinnati, one mile east of Hillsboro, to West street, Hillsboro, making it 19 miles long from Hillsboro southward to Sardinia, on the Cincinnati & Eastern. Gauge, 3 ft.

Columbus & Sunday Creek Valley.—Completed from a junction with the Pittsburgh, Cincinnati & St. Louis road, about seven miles east of Columbus, O., southeastward 22 miles to Bush.

This company acquired the short line of the Ohio Central from New Lexington south to Moxahala, and extended it 7 miles in 1879.

Dayton & Southeastern.—An extension was completed from the 1878 terminus at Musselman's, O., southeastward

22 miles to Richmond Dale, making the whole length of the road from Dayton, 92 miles. Gauge, 3 ft.

Dayton, Corvinton & Toledo.—Completed from a junction with the Dayton & Union road six miles west of Dayton northwestward 35 miles to Versailles, on the Cleveland, Columbus, Cincinnati & Indianapolis. Gauge, 3 ft.

Niles & New Lisbon.—A branch was completed from New Lisbon, O., down the valley 3 miles to the mines of the Cherry Valley Iron Company.

Springfield Southern.—This road, late the *Springfield, Jackson & Pomeroy*, had the *Horse Creek Branch* completed from a junction with the main line at Jackson 2 miles to coal mines at Eureka. Gauge, 3 ft.

Valley of Ohio.—Completed from Cleveland, O., southwest 66 miles to Canton. No track was laid before 1879.

Also 6 miles of the *Toledo, Delphos & Burlington* and 16½ of the *Lake Erie & Western* (given under Indiana) are in Ohio, and its total is 219 miles.

MICHIGAN.

Chicago, Saginaw & Canada.—Extended from Edmore, Mich., westward 12 miles to Lake View, in Montcalm County, making the road 36 miles long from St. Louis westward.

Grand Rapids & Indiana.—This company constructed a branch from its northern terminus at Petoskey, Mich., northeast 6 miles to Crooked Lake, where it connects with communicating lakes and rivers navigable by small steamboats all the way to Cheboygan.

Port Huron & Northwestern.—Completed from Port Huron, Mich., north by west 26 miles to Crosswell. Gauge, 3 ft.

Saginaw & Mount Pleasant.—Completed from a junction with the Flint & Pere Marquette at Coleman, Mich., southwest 14½ miles to Mt. Pleasant. Gauge, 3 ft.

The total in Michigan is 58½ miles.

INDIANA.

Evansville & Terre Haute.—This company completed a branch in October from the main line near Fort Branch, Ind. (20 miles north of Evansville), westward 6 miles to Owensville.

Frankfort & State Line.—Completed from Frankfort, Ind., westward 6 miles. Gauge, 3 ft.

Indianapolis, Decatur & Springfield.—Extended from the former terminus at Guion, Ind., eastward 40 miles, leaving but 11 miles of track to lay to complete the road to Indianapolis.

Indianapolis, Delphi & Chicago.—Extended from Monticello, Ind., south by east 13 miles to Delphi, making the road 38½ miles long from Rensselaer. The extension was opened Sept. 4. Gauge, 3 ft.

Lake Erie & Western.—This company, the successor of the *Lake Erie & Louisville*, has extended its road from Celina, O., southwestward 53½ miles to Muncie, Ind., to connect with the Lafayette, Bloomington & Muncie, which has been consolidated with it. From Celina southwestward 16½ miles, the new road is in Ohio. The extension makes the whole main line 354 miles long, from the junction with the Lake Shore, at Fremont, O., southwest and west to a junction with the Chicago & Alton and Illinois Central at Bloomington, Ill.

Louisville, New Albany & St. Louis.—Extended from the former eastern terminus at Princeton, Ind., eastward 16½ miles to the Pike County line, making the whole length of the road 45 miles, from this point west to Albion, Ill.

Northwestern Grand Trunk.—Extended from Valparaiso, Ind., westward 1½ miles, and from Thornton, Ill., eastward 13½ miles, 6½ of the latter being in Illinois.

Terre Haute & Southeastern.—This company, the successor of the *Cincinnati & Terre Haute*, extended its road from Markland, Ind., southeast 14 miles to Worthington, Ind., on the Indianapolis & Vincennes Railroad, making the line 40 miles long from Terre Haute southeastward.

Toledo, Delphos & Burlington.—This company, the successor of the *Toledo, Delphos & Burlington*, the *Delphos & Kokomo* and the *Delphos, Bluffton & Frankfort*, completed a line from a point six miles east of the line between Ohio and Indiana westward 30 miles to Bluffton, Ind., uniting a section 14 miles long west of Bluffton with one 43 miles long in Ohio, and completing a line 98 miles long from Holgate, O., southwestward to Warren, Ind., with a branch of 25 miles in Ohio. Gauge, 3 feet. Six miles of the new road are in Ohio.

The total in Indiana is 164½ miles.

ILLINOIS.

Belleville & Eldorado.—Completed by an extension from Benton, Ill., westward 18 miles to a connection with the Illinois Central and the Belleville & Southern Illinois at Duquoin, making the road 50 miles long from its junction with the Cairo & Vincennes at Eldorado to Duquoin. It is worked by the Belleville & Southern Illinois as a branch.

Chicago & Strawn.—This road, which with the Chicago & Paducah is to give a Chicago outlet to the *Wabash, St. Louis & Pacific* road, was completed for the distance of 47 miles on the route from Strawn to Chicago, and track-laying was in progress at both ends of the line when the year closed.

Chicago & Western Indiana.—Completed from the northern terminus of the Chicago & Eastern Illinois at Dolton, Ill., northward 16 miles into the city of Chicago.

It is to serve as a Chicago entrance for the Chicago & Eastern Illinois and the Wabash, St. Louis & Pacific. A few hundred feet of track remained to be laid at the close of the year.

Illinois Central.—This company's *Chatsworth Division* was extended by the construction of 8.33 miles of road by the *Kankakee & Southwestern* Company from Chatsworth south by west to Strawn, and by the construction of 10½ miles west by south from Strawn to Stewart by the *Clinton, Bloomington & Southeastern* Company. A further extension to Bloomington is intended.

Also 6½ miles of the *Northwestern Grand Trunk* (given under Indiana) are in this state, and the total in Illinois is 106½ miles.

WISCONSIN.

Chicago & Tomah.—A branch was completed from Dankloft Junction, southward 13½ miles to a point 3½ miles south of Montpont. The road-bed is graded eight or nine miles further south to McCormick, where it will join the Galena & Wisconsin. Gauge, 3 ft.

Chicago, Milwaukee & St. Paul.—The *Viroqua Branch* was completed by an extension from Melvina, Wis., southward 21 miles to Viroqua, making it 33 miles long from its junction with the La Crosse Division at Sparta. It was opened through Sept. 1.

Milwaukee, Lake Shore & Western.—The *Northern Extension* was completed from Clintonville, Wis., northwestward 20 miles to Tigerton, making the road 176 miles long. It was opened to Tigerton Dec. 8. The *Oshkosh Extension* was completed from the main line at Hortonville southward 11½ miles, leaving 11 miles more (which is ready for the track) to complete it to Oshkosh.

North Wisconsin.—Extended from Granite Lake, Wis., north 7½ miles, making the road 70 miles long, from Hudson northward. The road-bed was completed and the ties bedded for 12½ miles further, on which track would have

been laid if the mills had not failed to deliver rails in time. An extension 40 miles further is located.
Wisconsin Valley.—Extended from Wausau, Wis., north by west 17½ miles to Jenny, making the road 107½ miles long from Tomah northeast and north.
 The total in Wisconsin is 90½ miles.

MINNESOTA.

Caledonia, Mississippi & Western.—Completed from a junction with the Chicago, Clinton, Dubuque & Minnesota near Sumner, Minn., westward 57½ miles to Preston. Gauge, 3 ft. It has been built by the Waukon & Mississippi Guaranty Company.

Chicago & Northwestern.—This company completed a road from a junction with its Winona & St. Peter Railroad at Tracy, Minn., west 71 miles to Volga, Dak., about two miles west of the Sioux River. The 46.4 miles of the road in Minnesota were built by the Chicago & Dakota Company, and the 24.6 miles in Dakota by the Dakota Central. Work is progressing on an extension of 64 miles into the James River valley, and a further extension of 90 miles to the Missouri River is decided upon.

Chicago, Milwaukee & St. Paul.—The road completed by this company in Minnesota includes the following:

The **Short Line**, extending from St. Paul to Minneapolis, 9 miles, on which tracklaying was completed early in December. The **Hastings & Dakota Division** was extended from Montevideo west by north 44½ miles to Ortonville, Big Stone Lake, on the western border of the State, making the whole division 202 miles long, from the Mississippi at Hastings westward entirely across the state. A branch of this division 1 mile long, from Vermillion to Bridgeport, was also completed in the year.

St. Paul & Duluth.—A branch was constructed from the junction with the Northern Pacific at Thomson to Knife Falls, 6 miles, to give an outlet for saw mills.

St. Paul & Sioux City.—This company, with which have been consolidated the **Sioux City & St. Paul** and the **Worthington & Sioux Falls**, has completed during the year the following: The **Fort Dodge Branch** from the main line at Crystal Lake, Minn., south by east 34 miles to Blue Earth City.

The **Rock Rapids Branch** from the Worthington & Sioux Falls line at Luverne, Minn., south 28 miles to Doon, Iowa, 10½ miles, being in Minnesota. The **Black Hills Branch** from the main line at Heron Lake, Minn., westward 44 miles to Woodstock.

St. Paul, Minneapolis & Manitoba.—This company (the successors of the **St. Paul & Pacific**), completed its **Loop Line** from the 1878 terminus at Alexandria, Minn., west by north 78 miles to its junction with the main line at Barnesville, which is 247 miles from St. Paul by the main line, and 220 by the branch and 13 miles south of the Northern Pacific crossing. The whole length of the loop line is 230 miles, the southern junction being but 10 miles from St. Paul and two from Minneapolis.

The company also completed an extension 1½ miles long at its northern end, to a landing on Red River at St. Vincent.

This company also completed a branch 1½ miles long to the St. Paul fair grounds.

It also extended the **Grand Forks Branch** from the Red Lake River at Fisher's Landing northwestward 14 miles to Grand Forks, Dak., on Red River, making the branch 26 miles long from the junction with the main line at Crookston, all in Minnesota.

Southern Minnesota.—On the eastern end an extension was constructed from La Crescent Junction, Minn., northward up the Mississippi 3 miles to a connection with the Chicago, Milwaukee & St. Paul track, near the upper end of its La Crosse Bridge.

Southern Minnesota Extension.—This company in 1878 built an extension of the Southern Minnesota from Winnebago City westward 43.3 miles to Jackson, Minn. In 1879 it completed a further extension from Jackson northwestward 95 miles to Flandreau, Dak., 86½ miles of which are in Minnesota. A branch from Flandreau southward to Sioux Falls, 40 miles long, was graded. The extension to Flandreau is for a long distance parallel with, and but three or four miles distant from, the Black Hills Branch of the Sioux City & St. Paul.

Also 13 miles of the **Fort Dodge Extension** of the Minneapolis & St. Louis (given under Iowa) are in Minnesota, and the total in the state is 450½ miles.

IOWA.

Burlington & Northwestern.—Extended from Winfield, Ia., northwestward 8 miles to Crawfordville, 43 miles from Burlington, and 26 miles from the junction of this road at Mediapolis with the Burlington, Cedar Rapids & Northern, over which it has a third rail to Burlington.

Burlington, Cedar Rapids & Northern.—The Iowa City Division was extended from Iowa City south 12 miles to a junction with the Muscatine Division 2½ miles east of Riverside, making it 21 miles long from its junction with the main line at Elmira southwestward. At Riverside it connects with the Muscatine Division, which has itself been extended from Riverside west 45½ miles to What Cheer, where there are coal mines. All the new road was built by the Iowa City & Western Company.

Chicago & Northwestern.—This company extended the Toledo & Northwestern Railroad, which it recently purchased, from Toledo, Iowa, northward 8½ miles to Garwin, making the branch 11½ miles long from its junction with the Chicago & Northwestern.

Chicago, Bellevue, Cascade & Western.—Completed from a junction with the Chicago, Clinton, Dubuque & Minnesota, at Bellevue, Iowa, westward 36 miles to Cascade. Gauge, 3 ft.

Chicago, Burlington & Quincy.—The Brownsville & Nodaway Valley Railroad (called the "Villisca Branch") was extended from Clarinda, Iowa, south 21 miles to the Omaha line of the Wabash, St. Louis and Pacific at Burlington Junction, making the whole branch 35 miles long, from Clarinda junction south. Ten miles of the extension are in Missouri. The **Chariton Branch** was extended from Leon, Iowa, westward 35 miles to Mt. Airy, making the whole length of the branch 72 miles from Chariton southwest and west. The **Albia & Des Moines Branch** was extended from Knoxville, Iowa, northwestward 36 miles to Des Moines, making it 69 miles long from the main line at Albia. The **Indianola Branch**, which was 17 miles long at the end of 1878, was extended north by west 13 miles to Indianola, making it 30 miles long from the junction three miles northwest of Chariton north by west to Indianola. The **Creston & Northern Branch**, which extended from Creston north 20½ miles at the beginning of the year, was completed 9½ miles further westward by a circuitous route to Fontanelle.

Des Moines, Adel & Western.—Extended from Adel, Iowa, west by north 20 miles to Pandora, making the road 27 miles long from its junction with the Des Moines & Fort Dodge at Wauke. Gauge, 3 ft.

Dubuque & Dakota.—This company laid track on the roadbed constructed a few years ago by the Iowa Pacific Company, from the Cedar Falls & Minnesota line of the Illinois Central at Waverly, Iowa, westward 41 miles to Hampton.

Fort Dodge & Fort Ridgely.—This road has been reported variously in different years. Our latest news from the old company was that 22 miles were built in 1877 and 4 in 1878.

It was acquired last year by the Minneapolis & St. Louis Company, which reports that the track laid at the beginning of 1879 was 13 miles, which was extended 17 miles during the year to Livermore, making the road 30 miles long from Fort Dodge north, and leaving a gap of 40 miles to complete the connection with the Minneapolis & St. Louis, of which it is to form a part.

Fort Madison & Northwestern.—Completed from Fort Madison, Iowa, westward, 11½ miles to West Point. This is the beginning of the road. Gauge, 3 feet.

Maple River.—A branch of this road was completed from a point about a mile east of Wall Lake north 12 miles to Sac City, chiefly to bring into market lands of the Iowa Land Company. It, as well as the main line of the Maple River Railroad, is worked under a temporary lease by the Chicago & Northwestern.

Minneapolis & St. Louis.—The Fort Dodge Extension was completed from Albert Lea, Minn., southwest 35 miles to Forest City (13 miles of which are in Minnesota), to meet a road from the south (the Fort Dodge & Fort Ridgely), which is being extended northeast. The gap at the end of the year was 40 miles, on which the grading is about half done.

Missouri, Iowa & Nebraska.—Extended from Centerville, Iowa, westward 28 miles to Corydon, completing a line 118 miles long from Alexandria, Mo. (five miles below Keokuk), westward.

Also there are in Iowa 17½ miles of the **Rock Rapids Branch** of the Sioux City & Pacific (given under Minnesota), 24 miles of the **Iowa & Dakota Extension** of the Chicago, Milwaukee & St. Paul (given under Dakota), and 65 miles of the **Omaha Extension** of the Wabash, St. Louis & Pacific (given under Missouri), and the total new road in Iowa is 472½ miles.

MISSOURI.

Chicago & Alton.—In the spring, this company completed (through the Kansas City, St. Louis & Chicago Company) its Kansas City line by laying 30 miles of track to Kansas City, making it 163 miles long from its junction with the Louisiana & Missouri River road at Mexico, and giving the Chicago & Alton a line 487 miles long from Chicago to Kansas City.

St. Joseph & Des Moines.—Extended from Union Star, Mo., northeastward 27 miles to Albany, making the line 50 miles long from St. Joseph. Gauge, 3 ft.

St. Louis, Keokuk & Northwestern.—Completed by an extension from Clarksville, Mo., southward 44 miles to a junction with the St. Louis-Kansas City line of the Wabash, St. Louis & Pacific at St. Peter's, 32 miles from St. Louis, making the road 134 miles long, from St. Peter's to Keokuk.

Wabash, St. Louis & Pacific.—The St. Louis, Kansas City & Northern, which was consolidated with this road in the fall, in October completed through the Council Bluffs & St. Louis Company its Omaha Extension from Pottsburg, Mo., northwestward 143 miles to Council Bluffs, Iowa, making a line 410 miles long, from St. Louis to Council Bluffs, 65 miles of which are in Iowa.

It also built a line 8 miles long, from its junction with the Hannibal & St. Joseph to the Kansas City bridge, where it has heretofore used the Hannibal & St. Joseph track.

Also there are in Missouri 10 miles of the **Villisca Branch** of the Chicago, Burlington & Quincy (given under Iowa), and 6½ miles of the **Joplin Branch** of the Kansas City, Fort Scott & Gulf (given under Kansas), making the total new road in the state 2 63½ miles.

KANSAS.

Atchison, Topeka & Santa Fe.—This company had the **Cowley, Sumner & Fort Smith Branch** completed from the southern terminus of the **Wichita & Southwestern Branch** of its road at Wichita, Kan., south by east 38 miles to Winfield, Cowley County, and the **Wellington Branch** of this branch from Mulvane Junction 15 miles below Wichita, southwestward 17 miles to Wellington. The **Marion & McPherson Branch** was completed from the main line at Florence northwest 10 miles and thence west 37 miles to McPherson. The **Kansas City, Emporia & Southern Branch** was completed from the main line at Emporia, Kan., southward 63 miles to Salt Creek.

Central Branch, Union Pacific.—This road was extended by the **Atchison, Colorado & Pacific Company** (successor of the **Atchison, Solomon Valley & Denver** and other companies) from Cawker City, Kan., west by north 40 miles to Kirwin, which is 242 miles west of the eastern terminus of the Central Branch road at Atchison. The **South Solomon Division** was completed from Downs, 209 miles west of Atchison, westward 24 miles to Bull's City.

Kansas Central.—Extended from Onaga, Kan., westward 17 miles, making the road 101 miles long from Leavenworth westward. The grading was nearly completed for 18 miles further, to the Little Blue River. Gauge, 3 ft.

Kansas City, Fort Scott & Gulf.—The Joplin Branch was constructed from the southern terminus of this road at Baxter, Kan., eastward 15½ miles to Joplin, Mo., of which 9½ miles are in Kansas.

Kansas City, Lawrence & Southern.—The Southern Kansas Branch was extended from the former western terminus at Independence, Kan., west 56 miles.

Kansas Pacific.—The Solomon Branch was extended from Minneapolis, Kan., north by west 34½ miles to a junction with the Central Branch Union Pacific at Bejoit, making the branch 57.3 miles long from its junction with the main line at Solomon. The **Union City & Fort Kearney Branch** was extended from Clyde, Kan., on the Central Branch road, westward 15 miles to another junction with the Central Branch road at Concordia, making the branch 70 miles long from Junction City. The **Salina & Southwestern** was completed in July from a junction with the Kansas Pacific at Salina, Kan., southward 36 miles to McPherson.

St. Louis & San Francisco.—This company during the year acquired the **Missouri & Western Railroad**, extending from its main line at Pierce City, Mo., westward 74 miles to Oswego, Kan. It extended it farther west 76½ miles during the year to within 1½ miles of Severy. It is in progress to Wichita, to complete a connection with the Atchison, Topeka & Santa Fe.

St. Louis, Kansas & Arizona.—Completed from Paola, Kan., where it connects with the Kansas City, Fort Scott & Gulf and the Osage Division of the Missouri, Kansas & Texas, southwestward 57 miles to Leroy, on the Neosho Division of the Missouri, Kansas & Texas. This line is parallel with and about 20 miles southeast of the line of the Kansas City & Santa Fe Division of the Kansas City, Lawrence & Southern. It has also graded, but not ironed, a branch 21 miles long from Osawatimie west by north to Ottawa.

Thirteen miles of the **Marysville & Blue Valley** (given under Nebraska) are also in Kansas, making its total 543½ miles.

NEBRASKA.

Atchison & Nebraska.—Through this company the **Lincoln & Northwestern Railroad** was completed from Lincoln, Neb., northwestward 50 miles toward Columbus, where it is to reach the Union Pacific.

Burlington & Missouri River in Nebraska.—The Nebraska Railway, which this company leases and works, was extended from York, Neb., westward 23 miles to Aurora, making it 133 miles long from Nebraska City. From Aurora it is to be extended about 20 miles north to the Union Pacific.

The **Brownville Branch** was extended from Brownville,

Neb., southward 4 miles to Nemaha City, making it 27 miles long from Nebraska City southward.

The **Republican Valley Railroad**, leased by this company, was extended from Red Cloud, Neb., westward 28 miles to Bloomington, making it 69 miles long from its junction with the main line at Hastings.

Fremont, Elkhorn & Missouri Valley.—This company, whose road is worked by the Sioux City & Pacific, extended its line from Wisner, Neb., westward and northwestward up the Niobrara Valley 59 miles to Oakdale, making the road 110 miles long, from the junction with the Union Pacific at Fremont.

Union Pacific.—Under the auspices of this company the following roads were built in 1879: **Marysville & Blue Valley.**—From a junction with the St. Joseph & Western at Marysville, Kan., northward 37 miles to Beatrice, Neb. Of this 13 miles are in Kansas. **Hastings & Grand Island.**—This road was completed from the western terminus of the St. Joseph & Western at Hastings, Neb., north 25 miles to the Union Pacific at Grand Island. It is worked as part of the St. Joseph & Western (which the Union Pacific controls) making that road 252 miles long from St. Joseph to the Union Pacific. **Omaha, Niobrara & Black Hills.**—Completed from the Union Pacific at Jackson, Neb., north 50 miles to Norfolk. **Omaha & Republican Valley.**—Extended from the 1878 terminus at County Lane, Neb., southwestward 22 miles to Stromburg in Polk County.

The total in Nebraska is 286 miles.

DAKOTA.

Chicago, Milwaukee & St. Paul.—The Iowa & Dakota Division was extended from the 1878 terminus at Patterson, Iowa, west 62 miles to Marion Junction, Dak., and thence southwest 71 miles to the Missouri River at Niobrara, making the whole division 358 miles long from its junction with the Iowa & Minnesota Division at Calmar, and completing a line from Milwaukee westward 595 miles. Of the extension 24 miles are in Iowa. A branch of this line from Rock Valley to Yorktown, Dak., was nearly all graded at the close of 1879.

Northern Pacific.—An extension from the Missouri opposite Bismarck, Dak., was completed early in December to a point 59 miles west.

Sioux City & Dakota.—This company was formed during the year by the consolidation of the **Dakota Southern** and the **Sioux City & Pembina**. The latter was extended during the year from the 1878 terminus at Beloit, Iowa, northward 25 miles to Sioux Falls, Dak. The Sioux River is crossed at Beloit, and the whole extension is in Dakota. This makes this line 77 miles long from the Sioux City-Yankton line at Davis Junction north.

Besides these, 24½ miles of the **Chicago & Northwestern's Dakota Central** line, and 8½ miles of the **Southern Minnesota Extension** (both given under Minnesota) are in Dakota, making its total 225½ miles.

COLORADO.

Denver, South Park & Pacific.—Extended from Webster, Col., southwestward 47 miles, making the main line 116 miles long from Denver. Gauge, 3 ft.

This road was completed 10 miles further than we reported for 1878.

Atchison, Topeka & Santa Fe.—On the proposed line to Leadville 7 miles of track were laid early in the year, and a vast deal of other work done.

The total is 54 miles.

NEW MEXICO.

Atchison, Topeka & Santa Fe.—This company, through the **New Mexico & Southern Pacific**, extended its line from the 1878 terminus, in New Mexico, 8.3 miles below the Colorado line, southwestward 163 miles to a point 55 miles beyond Las Vegas, making the line 831 miles long from Atchison.

ARIZONA.

Southern Pacific.—Extended from Adonde, Ariz., eastward 152 miles to Casa Grande, completing 182 miles east of Fort Yuma, in Arizona, and making the line 913 miles long from San Francisco, of which 251 belong to the Central Pacific.

UTAH.

Utah & Pleasant Valley.—In 1878 this road was completed from a junction with the Utah Southern at Springville, Utah, southeast 14 miles, but was not included in our record for the year. In 1879 it was extended 46 miles further southeastward to the Pleasant Valley coal mines, and at the northern end an extension of 4 miles was made in order to connect with the Utah Southern at Provo instead of Springville, making the line 64 miles long. It was built to give an outlet to the coaling coal of Pleasant Valley. Gauge, 3 ft.

Utah Southern.—Extended from York, Utah, southward 30 miles to Juab, making it 105 miles long from Salt Lake City. From Juab it is continued southward by the **Utah Southern Extension**, which was completed from the southern terminus of the Utah Southern at Juab, south by west 53 miles to Deseret, Utah.

The total in Utah is 133 miles.

IDAHO.

Utah & Northern.—Extended from Blackfoot, Idaho, northward 130 miles into Montana, making the whole line 310 miles long from the junction with the Union Pacific at Ogden. Gauge, 3 ft. About 20 miles of the extension are in Montana—the first railroad ever built in that territory.

NEVADA.

Nevada Central.—Completed from a junction with the Central Pacific at Battle Mountain, Nev., south 50 miles, leaving 40 miles more to complete the road to its southern terminus at Austin, on which tracklaying is progressing rapidly. Gauge, 3 ft.

OREGON.

Western Oregon.—This company, the successor of the **Oregon Central**, extended the road southward 53 miles from St. Joseph, Or., to a junction with the Oregon & California Railroad at Junction City, making the whole length of the line 100 miles, from Portland to Junction City.

Whitman & Weston.—This branch of the Walla Walla & Columbia River Railroad was completed by the **Oregon Railroad & Navigation Company** from the junction at Whitman, Wash. Ter., south 50 miles to Weston, Or. Gauge, 3 ft. Three miles are in Washington Territory.

The total in Oregon is 70 miles.

Accident Insurance Policies.

A negro cook on a caboose on the Alabama Great Southern Railroad took out an accident insurance policy for \$1,000 at 8 o'clock the other night. At 11 p. m. he accidentally fell from the train and was killed. The negroes along the line believed that if he had not taken out the policy he would not have been killed. An attempt on the part of the agent to sell accident tickets the following day proved unavailing.—Nashville (Tenn.) American.



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EDITORIAL ANNOUNCEMENTS.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

RAILROAD CONSTRUCTION IN 1879.

We present this week a detailed record of the new railroad constructed in the United States in 1879, from which it appears that the total of the year was 4,430 miles, which is the largest since 1872, and has been exceeded only four times in the history of the country—the four years ending with 1872. For the eight years that we have made up this record, which includes road on which track was laid during the year, whether opened for traffic or not, and differs materially from the figures in Poor's Manual (which usually include only road open for business), the miles of new road constructed have been:

Year.	Miles.	Year.	Miles.
1872.....	7,340	1876.....	2,460
1873.....	3,883	1877.....	2,301
1874.....	2,025	1878.....	2,916
1875.....	1,561	1879.....	4,430

Compared with 1878, therefore, last year shows an increase of more than 50 per cent. At the close of 1878, according to Poor's Manual, the length of railroad in the country was 81,841 miles. Adding the mileage constructed in 1879, we have the grand total of 86,263 miles of railroad in the United States at the beginning of the current year, when the total of all Europe is about 100,000 miles, and of all the rest of the world probably not 20,000 miles. The increase in this country was at the rate of about 5½ per cent., the increase of population being doubtless something less than 3 per cent., so that the number of inhabitants per mile of railroad has become less during the year. The population of the country is now probably about 49,500,000, and this gives 574 persons to support one mile of railroad, against 585 at the beginning of 1879. In Europe, the average is about 3,333 per mile of road, and in Sweden, where the mileage in proportion to population is largest, it is 1,667. We have given these figures before, but we repeat them to emphasize the fact that this is peculiarly the railroad country, not simply because it is big, but because the same population requires a larger amount of railroad here than anywhere else.

Of the 4,430 miles, 923½ miles are of narrow gauge (18 miles 2 ft., 23 miles 3½ ft., and the rest 3 ft. gauge). This is a little less than 21 per cent. of the whole, against about 30 per cent. in 1878.

Although the panic of 1873 has been said to have caused stagnation in railroad construction especially,

the excess of which seemed to be the leading or a leading cause of the catastrophe, still there has probably been but one year since that the ratio of increase in construction has not equaled or surpassed that of increase in population. However light may have been the effective demand for other labor-saving and productive machinery—and it has been so light that it is the prevailing impression among many manufacturers that the stock of the country has not been fully maintained, not to say increased—for this special machine, the costliest of all, the demand has been sufficient in the duldest of times to occasion decidedly large additions every year. And, with the return of prosperity and confidence, the movement of capital to the construction of additional railroads, by which so short a time ago such vast sums were lost, is rapid and decided. Railroad construction was extraordinarily cheap in 1879 (most tracks being laid with rails ordered early in the year at the prices then prevailing), yet the expenditure for the new roads reported in our record could hardly have been less than \$65,000,000, while millions more will have to be spent to complete and improve them; and all the time there are going on costly improvements and additions to the old roads, which do not add to the mileage and so are not here recorded.

In the years from 1873 until 1879, however, the new roads differed largely in character and location from those constructed during the five or six years previous to 1874. In these earlier years the construction was largely of long lines by new companies, and chiefly (though by no means wholly) in the West, where it was supposed that there would be a great increase of population and production along the roads. After the panic the new construction was largely of short local lines, a large proportion of which were in the older states, which were intended to give a better outlet for a population already on the ground. Latterly these roads were very largely built by or under the auspices of old railroad companies with good credit. In 1878 again appeared a decided movement toward building roads in new country, incited by the great increase in immigration, chiefly from the East to those parts of the West where there was still an abundance of cheap and fertile land. But these differed from the movement before 1873, in the fact that the work in 1878 was prosecuted almost exclusively by old railroad companies, which built the new lines as branches and extensions, and had better knowledge than any one else could have as to the prospects for a remunerative traffic, and could build cheaper because of their established credit. That year, Minnesota, Iowa, Missouri, Kansas and Colorado led in the amount of new railroads, with Ohio and Texas close behind.

Now, in 1879 this movement has become much more decided. More than half the new road is in what we call the "Northwest," and very nearly one-half of it in six contiguous states west of the Mississippi—Minnesota, Iowa, Missouri, Kansas, Nebraska and Dakota—which might properly be called the "North-west Mississippi Valley." This, doubtless, is precisely where the growth of population has been most rapid, and it contains vast quantities of fertile land which could not be cultivated advantageously without additional railroads. The distribution of the construction, however, for eight years past, both by states and by groups of states, will be best shown by the accompanying table, which will bear studying.

Mileage of New Railroad Constructed in Each State and Territory for Eight Years.

	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
Alabama.....	134	18	0	0	0	116	22	7
Alaska.....	0	0	0	0	0	0	0	0
Arizona.....	0	0	0	0	0	0	80	152
Arkansas.....	136	84½	18	38½	45	0	7½	23
California.....	105	85	140½	185	314½	235½	102½	9
Colorado.....	105	121	25	111½	154½	123½	204½	64
Connecticut.....	25	29	0	21	7	3½	0	0
Dakota.....	219	204½	0	0	0	0	24	222½
Delaware.....	20½	21½	19	5	0	0	6	0
Florida.....	10½	0	18	0	0	13	0	32
Georgia.....	46	122	6	4	42	0	67	59½
Idaho.....	0	0	0	0	0	0	100	110
Illinois.....	609	274½	250	200	58	55½	183	100½
Indiana.....	183	84½	299½	199½	72½	24	84	164½
Indian Ter.....	142	0	0	0	0	0	0	0
Iowa.....	453	93	48	84½	99½	157½	223½	472½
Kansas.....	415	35	61	0	76	50½	183½	185½
Kentucky.....	143	65½	31½	0	158	23½	23½	67
Louisiana.....	3	0	0	0	0	2	0	72
Maine.....	62½	0	37½	10	20	0	0	20½
Maryland.....	101	84	12	17	15	0	0	21
Massachusetts.....	57	17½	27½	36	5	17½	0	5
Michigan.....	571	190	48	30	40	50	111½	25½
Minnesota.....	307	48	30	0	54	204	338½	404½
Mississippi.....	22	7	27	0	10	8	34½	19½
Missouri.....	314	226½	31	27	109½	36	223½	28½
Montana.....	0	0	0	0	0	0	0	21
Nebraska.....	212	41	0	22	52	60	55	285
Nevada.....	18	18	0	64	0	0	0	0
New Hampshire.....	43	0	45	15½	9½	18	35	9½
New Jersey.....	103	49½	80	72½	84	81½	8	6
New Mexico.....	0	0	0	0	0	0	54	103
New York.....	423	219½	125½	296	60½	123½	123½	123½
North Carolina.....	50	15	64	18	43	27	10	10
Ohio.....	409½	172	17½	56	275	260	174½	219
Oregon.....	282	0	0	0	0	0	35	71
Pennsylvania.....	251	253	191½	1309	90	119½	167	165½
Rhode Island.....	27	0	14	0	0	0	0	0
South Carolina.....	55	88	0	15	17	45½	10½	5
Tennessee.....	15	114	0	0	74	21½	10	165
Texas.....	391	355½	75	34½	38½	183½	163	168
Utah.....	0	0	0	0	0	0	0	0
Vermont.....	31	53	5	38	0	71	0	6½
Virginia.....	49½	33	79½	0	10	164	19½	33½
Washington T.....	40	50	0	0	0	52½	12	8
West Virginia.....	70	26½	0	0	0	29½	27½	20
Wisconsin.....	459½	320½	10	23	123½	62	91½	90½
Wyoming T.....	0	0	0	0	0	0	0	0
Total.....	7,340	3,883	2,025	1,561	2,450	2,915	2,916	4,430

	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
New England (a).....	194	289	190	174	50	119	41	42
Middle States (b).....	1,010	541	587	497	259	352	344	137
South Atlantic States (c).....	244	201	144	92	114	92	116	149
Gulf States (d).....	560	394	358	34	299	213	218	244
South Interior (e).....	55	464	49	59	197	70	64	220
North Interior (f).....	1,210	452	400	165	363	340	370	442
Northwest (g).....	3,086	1,130	300	357	550	670	1,354	2,181
Far West Inter-rior (h).....	110	224	122	202	154	102	357	689
Pacific States (i).....	317	125	147	110	345	288	192	73
Total.....	7,340	3,883	2,025	1,561	2,450	2,915	2,916	4,430

(a) New England includes Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut.
(b) The Middle States include New York, New Jersey, Pennsylvania, Delaware, Maryland and the District of Columbia.
(c) The South Atlantic States include Virginia, North Carolina, South Carolina and Georgia.
(d) The Gulf States include Florida, Alabama, Mississippi, Louisiana and Texas.
(e) In the South Interior are included Indian Territory, Arkansas, Tennessee, Kentucky and West Virginia.
(f) The North Interior includes Ohio, Michigan and Indiana.
(g) The Northwest includes Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska and Dakota.
(h) The Far West Interior covers the district between Texas and the Northwest and the Pacific States.
(i) The Pacific States are California, Oregon and Washington Territory.

Thus, out of 4,430 miles of new railroad no less than 3,187 miles—more than the total completed in the whole country in 1878—was west of the Mississippi. Only one state (Ohio) east of the Mississippi built as much as 200 miles of road, and every one of the group of six named built more than that. Kansas leads in 1879 with 544 miles of road, followed by Iowa with 472, Minnesota with 451, and Nebraska with 285. All these built more road in 1879 than in any other of the eight, as also did Tennessee, Dakota and Utah, and of course New Mexico and Arizona, which railroads first entered in 1878, and Montana, which received its first track in the latter part of 1879, leaving Alaska alone of the United States without any railroad.

Examining the figures for "groups of states" at the foot of our table, we notice that New England has but 42 miles of new road in 1879, about the same as in 1878, but less than in any preceding year. In the Middle States there has been a great decrease, and the new mileage is the smallest we have ever reported. This is due chiefly to the insignificant construction in Pennsylvania, which heretofore, even in the duldest of times, has usually added largely to its mileage. There has not been much new work in the South Atlantic States, but more than in any of the five previous years. There was a small increase in the Gulf States (only Texas has shown much activity in many years). More than half the new road in the four states which we call the "South Interior" is in the single line of the Cincinnati Southern. The "North Interior" (Ohio, Michigan and Indiana) built a little more than in 1878. The construction in the Northwest was nearly twice as great last year as in 1878, or in any other year since 1872.

The "Far West Interior" so lately an utterly uninhabited wilderness, built nearly twice as much also as in 1878, and three times as much as in any earlier year, notwithstanding a great decrease in Colorado; but the Pacific States have not built so little road since 1871, California having none at all, for the first time for many years, though there has been some re-building there, and a little construction in preparation for track-laying.

If we distribute the mileage on the two sides of the Mississippi, we have:

	East of Miss.	West of Miss.	Total.
1872.....	4,353	2,987	7,340
1873.....	1,527	2,356	3,883
1874.....	1,487	538	2,025
1875.....	949	612	1,561
1876.....	1,156	1,304	2,460
1877.....	1,114	1,187	2,301
1878.....	1,178	1,738	2,916
1879.....	1,243	3,187	4,430

This comparison has never been made before, and it is striking. It is remarkable how little the construction east of the Mississippi has varied from year to year since 1872, and especially since 1875. The great construction there in 1872 was due to the filling up of Ohio, Michigan, Indiana, Illinois and Wisconsin with railroads. For several years these were the great field for railroad construction, as the six states west of the Mississippi have been in 1879. But the decrease after 1872 was chiefly in the trans-Mississippi states, and the revival is felt there almost exclusively; and this year, it appears, more road was built there than in 1872 even—more doubtless than in any preceding year.

The great feature of the year, therefore, has been the extension of the border railroads, and the opening of a vast area of farming lands which produce grain and live stock, which form the great staples of the traffic of Northwestern railroads. The traffic they develop will, much of it, be carried the entire distance to the Atlantic sea-board, and so is of importance not only to the new roads themselves, but also, to a greater or less extent, to a great portion of the old railroads east of the Missouri and north of the Ohio. The new roads are feeders of Montreal, New York and Baltimore, as well as St. Paul, Omaha and Kansas City. With very few exceptions they have been built by es-

established companies, with good credit, and with the expectation of making a profit by working them—not out of the contracts for their construction. Many are in districts now very thinly peopled, which may not for some time afford much traffic. How soon they will become profitable will depend upon the rapidity of growth of the country along their lines, which itself depends on circumstances not easy to foretell. For some years past there has been a great movement to the West, the dulness in other business increasing the tendency to farming; the prosperity here and the bad times abroad are likely to increase foreign immigration; a good harvest next summer and good prices for it would give a great impulse to this movement; a bad one would check it. But sooner or later the country on nearly all these new Western roads will afford them an ample support. They have been built at very low cost, and a very light traffic will pay the interest on it.

The prospects for construction in 1880 are good. A great many of the roads in the West, described in our record, are still in progress, and some of them will be long lines, though their construction may not be hastened if the growth along the completed parts is not satisfactory. It is, however, much more costly to build roads now, rails costing nearly twice as much as a year ago, and all other materials and rolling stock being much dearer. There are, doubtless, a great many people anxious to construct railroads in the way common before 1873—from the proceeds of bonds secured by the property to be bought with a portion of the money obtained for them; but the investing public, although much inclined to speculate and by no means as cautious as it has been for several years past, does not yet seem inclined to buy that kind of paper. But companies with profitable roads in operation find it easy to borrow money on easy terms, and the increase in the cost of construction will hardly prevent these corporations from building any new lines. Indeed, the danger seems to be rather that too much than too little new railroad will be built.

SPARKS AND CINDERS.

On another page will be found a very interesting paper on locomotive chimneys, or "smoke-stacks," as they are called in this country, by Mr. Snowden Bell. The paper refers especially to the arrangements used for arresting or catching sparks and cinders, and gives in a general way all the principal types of spark-arresters that have been used. A large book would be needed to give all these in detail, as the inventions which have been made and patented for "spark-catchers" and smoke-stacks have been almost numberless, and Mr. Bell has done an excellent piece of work in analyzing these and showing what the general principles are on which they all act. The field seems to have been an especially attractive one for inventors. The reason for this is not difficult to find, as hardly any more forcible reminder of the existence of an evil can be imagined than a cinder in one's eye—unless it be a cinder in one's wife's eye. Then, too, there is the almost perpetual question of damages from the destruction of fences, buildings and other property by sparks from the locomotives, which on many, if not most, roads is a heavy item of expense. When claims of this kind are presented oftener than usual, managers are prone to stir up the master mechanic and inquire why he does not improve his spark-catchers. In a measure, therefore, he feels both invited and compelled to devise some improvements in this part of his locomotives, and probably the majority of those who have had charge of the rolling stock of different railroads in this country have, at some time, also been inventors of spark-catchers.

The manner in which the inventive faculty has been, and is, exercised in this country is also worthy of observation. It will be found that wherever some contrivance is needed to effect a very simple purpose an almost unlimited amount of ingenuity will be exercised on it by different inventors; but, if the subject requires any profound, intricate, or subtle reasoning, research or analysis, comparatively few will devote themselves to it. Thus patent churns, nut-locks and car-couplers are numbered by the thousand, but inventions relating to valve-gear, or the distribution of material in bridges, or of the form of flanges of car-wheels are comparatively rare, for the reason that a much higher order of ability is required for investigating them than is needed for the simpler appliances, and without some special training and aid from mathematics they are difficult to understand clearly. In relation to spark-catchers, what is noticeable is that so much ingenuity has been exercised to mitigate an evil and comparatively so little to prevent it.

In devising a spark-catcher, the conditions of the

problem are that of maintaining a very violent combustion, which requires a tremendously strong draft, and at the same time separating the sparks and cinders from the current of air and gases before they escape from the chimney. This is not easy to do, as most persons have found out who have tried it, and after all the most that can be done is to mitigate the evil.

The means employed for catching sparks are:

1. A wire netting or sieve, which will prevent all those larger than the meshes or openings in the sieve from passing through. This can only be applied temporarily, because it is difficult or next to impossible to provide sufficient storage room for the cinders which may thus be caught. Therefore a wire netting is usually employed only for arresting the larger cinders, which are most likely to set fire to combustible material near the track.

2. Deflectors against which the current air, gases and cinders comes so as to deflect or change its direction. The cinders, being heavier than the gases, consequently have a greater momentum and are thrown beyond or outside of their current and are caught in some kind of depository. Another assumed effect is that the cinders by coming into violent contact with the deflector are broken up into smaller masses so as to be less dangerous than they otherwise would be.

3. Providing a chamber in the smoke-box so large that the speed of the current of smoke and gases will be diminished and they become in a measure quiescent, so that the cinders by their weight will be deposited in the chamber, instead of being carried up the chimney with the ascending currents. In some cases the space in the smoke-box is arranged so that by their momentum, as they leave the tubes, the cinders will be projected beyond the current, and deposited in the space or chamber provided.

As indicated in the paper by Mr. Bell, the difficulty with all these plans is in providing sufficient room for holding all the cinders carried away from the fire by the draft. Of course the more violent the latter, the larger will be the quantity of solid matter drawn away. Some plans have been devised for conveying the cinders from the smoke-box, or chimney, back again to the fire-box, but none of these methods have ever met with sufficient success to lead to their general introduction. A serious difficulty in the way of the success of such a plan is that only a portion—with some kinds of fuel a very small portion—of the sparks and cinders carried into the smoke-box are combustible. With coal, especially, they are chiefly formed of incombustible material, just as the cinders are which fall through the grate. To convey them into the fire-box does not get rid of them, but is only a process of taking out at one end and putting them in at the other. It is true that by doing so they may become broken up by mechanical action so as to be innocuous when they escape, and after all this is about the only beneficial result which any arrangement of spark-catchers can effect. It seems probable, though, that some of the ordinary methods in general use accomplish this result quite as well, and with simpler appliances than are required to carry the cinders from the smoke-box back to the fire-box.

It is not the purpose of this article, however, to discuss the efficiency of appliances for catching sparks, but to consider the means of prevention. When once cinders are drawn into the tubes, the best that can be done is to retain them there and provide some appliances so that they will be broken up or by the detention rendered incandescent. Prevention, though, is always better than cure, and therefore, if the sparks and cinders can be kept in the fire-box until the combustible portion is consumed and the incombustible portion is deposited in the ash-pan, then obviously we have accomplished the object very much more efficaciously than any possible method of arresting them afterward could.

Spark-catching must, of course, always be subordinate to making steam. Any arrangement provided for accomplishing the former, but which prevents or hinders the latter, is sure to be condemned. The general principle that it is easier to generate a given quantity of steam with a big boiler than with a little one, has been very slowly recognized, especially in this country. Now it is as obvious as a demonstration in mathematics, that if the combustion in a locomotive requires the passage of a given quantity of gases through the tubes per minute, their speed must be inversely proportioned to the sum of the areas of the cross-section of the tubes. That is, in other words, the larger the number of tubes in a locomotive boiler the slower may be the speed of the draft in them for a given rate of combustion. It is also plain that the longer the combustible sparks can be detained in the fire box the more likely they are to be consumed, and as a large boiler need not be forced so hard as a small one to do a given amount of work, it is obvious

that its whole action is slower, and therefore that not only will a larger proportion of the sparks be consumed, but a smaller number will be carried into the tubes and up the chimney. For these reasons, then, the conclusion must be drawn that a big boiler, if not the most effectual means of catching sparks, is a very excellent provision for diminishing their number or quantity.

It is true that a great deal of ingenuity has been exercised in devising means of promoting combustion in the fire-boxes of locomotives, but almost without exception these have fallen into disuse, and almost universally now the only form of fire-box used is what is called a "plain" box without deflectors, brick-arches or other devices of that kind. It seems certain that if, instead of exercising their ingenuity in contriving appliances for improving combustion and arresting sparks, inventors had devoted an equal amount of ability to studying the laws of combustion, and in adapting the proportions of boilers to the work to be done, their labors would have been more fruitful.

It should of course not be said that spark-catchers are useless. They have served an excellent purpose when it was necessary to work boilers which were too small up to their maximum capacity, and do this without burning up too much property. It is hardly probable, though, that if the proportions of boilers were improved spark catchers would be of so much importance as they now are.

Shortening the Central Pacific.

This company made quietly, on Jan. 1, an important change in the running of its through trains. As may be known to many of our readers, the line of the old Western Pacific, which formed the Central Pacific main line from Sacramento to its bay terminus at Oakland, opposite San Francisco, is not by any means a direct one. From Sacramento it runs nearly due south 57 miles to Lathrop, and at that point it is still 83 miles from San Francisco, or but a few miles nearer its destination than when it left Sacramento. Moreover this line had to cross the Coast Range, and to do so it ran through the Livermore Pass, where heavy grades were needed on both sides of the mountains. So unfavorable was this line that some three years ago the company began the construction of the San Pablo & Tulare and the Northern roads, which together formed a loop line, leaving the old road at Tracy, 68 miles from Sacramento, running up the east side of the Coast Range, and then skirting around its foot-hills along the shores of Suisun Bay, the Straits of Martinez and San Pablo Bay until it met the old line not far from the great wharf at Oakland. This loop line was completed last year and at once became really the main line, the old road as far as Tracy being used only for local business. It was a great improvement in so far as it avoided the heavy grades through the Livermore Pass, but it was even less direct than the old road, making a double circuit as it were, and it increased the distance between San Francisco and Sacramento by 11 miles, not a very serious matter for freight traffic, but more than the company thought desirable for passenger business.

Now the most direct line between the two cities has always been that of the California Pacific, which made, perhaps the nearest possible approach to an air line, but this route required a water transit of some 26 miles, from South Vallejo to San Francisco. To avoid this long steamboat route, the company decided to connect this road with the new loop line at some point on the Straits of Martinez, and for that purpose it built a branch line, leaving the California Pacific at Fairfield, 40 miles from Sacramento, and running down 17 miles to the old town of Benicia on the straits, here less than a mile wide. At first it was proposed to bridge the narrow channel, but the difficulties presented by the rapid current (for these straits are the outlet through which pour all the waters of the Sacramento, the San Joaquin and their tributaries on their way to San Francisco Bay) and the active opposition which might be expected from the navigation interest decided the company to abandon the idea of a bridge and to try a steam ferry. For this purpose it has built a ferry-boat, which is probably the largest in the world, for it can carry at once two full passenger trains of engine, tender and 10 cars each, or 48 freight cars. This boat will run across the straits from Benicia to a point on the opposite shore called Port Costa, located, for convenience in handling the boat, not directly opposite, but a little below, and there the trains pass upon the new loop line to Oakland. The ferry-boat takes the entire train on board, and the crossing takes but a few minutes, making a hardly perceptible break in the journey.

By the old road the distance from San Francisco to Sacramento, including the ferry across the bay to Oakland Wharf, was 140 miles; by the Martinez loop line it was 151 miles, but by the new route it is only 94 miles, making a saving of 46 miles over the old road or 57 miles over the Martinez route lately in use. The new line includes the use of the California Pacific and its Northern Branch from Sacramento to Benicia, 57 miles; the ferry of a mile across the Straits of Martinez; the loop line from Port Costa to Oakland Wharf, 32 miles, and the ferry of four miles across the bay to San Francisco. Not only the passenger trains but some freight will be brought this way, and some will be unloaded at Benicia, where freight docks are being built and arrangements for transfer to vessels made. The loop line will still be used for local business and the trains to Stockton, La-

throp, the Visalia Division and the Southern Pacific lines to Los Angeles and Arizona.

Besides the reduction in distance there has been a shortening up of time elsewhere, so that the new time-table reduces the time of the overland trains nearly six hours on the run between San Francisco and Ogden.

Draw-Bridge Signals.

On another page two letters from Mr. Hall, the inventor of the automatic system of signals bearing his name, are published. Appended to one of those is a note giving some of the facts in relation to the Woodbridge accident. Whether the distance signals showed white or red (the accident occurred at night) at the moment the train approached is a disputed point which probably the company's investigation will bring out. Until that investigation takes place, the officers of the road are disposed to be somewhat reticent about the matter, and perhaps properly so. If the distant signal did show a white light when the draw was open, the company which put up the signals will be expected "to rise to explain."

Be that as it may, though, the significance of the accident with reference to the full-stop rule at draw-bridges is apparent.

The daily papers during the past week contained a report of a narrow escape from another very serious accident at a draw-bridge in Boston. This is reported as follows:

"By a peculiar combination of circumstances, the sudden breaking of a bell-wire on board the steamer Lancaster, in the harbor, yesterday morning, Jan. 11, came very near resulting in a terrible disaster to a passenger train on the New York & New England Railroad. The Lancaster, a large iron vessel, heavily loaded with coal, had passed the Congress street draw, and was approaching the railroad bridge, when the pilot rang to stop the engine. The wire broke, and the engineer failing to receive the signal, the vessel kept on, striking the bridge with great force. The timbers were badly twisted; the bolt which locks the draw when closed, was broken, and the railroad tracks upon the bridge were bent about eighteen inches from their proper position. No one was upon the bridge or near the scene at the time, and the Sunday morning inward passenger train was approaching, but a few hundred feet away. When but a train's length from the bridge, the engineer noticed the disconnected rails. He reversed the engine and applied the air brake, bringing the train of five cars to a stop about fifteen feet from the bridge. Had the train passed over it would have been plunged into the water at the side of the track, and it being high tide at the time the loss of life would have been great. The engineer is deserving of great credit for his watchfulness in discovering the accident almost at the instant of its occurrence and for his prompt act for the protection of the lives of the passengers."

Whether, with such instances as these coming so close together, it is safe to disregard the full-stop rule, our readers are as well able to judge as we.

With reference to draw-bridges in Great Britain, it has been suggested to us, since our last issue, that probably they are protected not only with interlocking signals, but by block signals besides. Thus, supposing that there is a block station on each side of the bridge, say at a distance of two miles away. In such a case, when a train passed either station going toward the bridge, the signalman would telegraph to the bridge-tender "Train on Line," and he would then know that it would be unsafe to open the bridge. On the other hand, if a vessel was approaching and it was desirable to open the draw and there was no train on line, the bridge-tender would telegraph each way "draw open," and the two signalmen would then "block" the line, that is, stop all approaching trains until they received a message saying that the bridge was closed.

This, it will be seen, would give a very great degree of security, so that if used in connection with interlocking signals at the bridge, the chances of accident would be removed quite beyond what might be considered a safe limit. And yet it must be admitted that it would not guard against an accident like that from which the train in Boston escaped so narrowly, unless there was some provision by which a disturbance of the continuity of the track would display a danger signal simultaneously.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads this year as follows: Nevada Central.—Completed to a point sixty miles south of Battle Mountain, Nev., an extension of 10 miles.

This makes 10 miles, the first track recorded as laid in 1880.

Report on Taxation of Railroads and Railroad Securities.

(Concluded from page 17.)

SUMMARY OF LAWS IN RELATION TO RAILROAD TAXATION IN FORCE IN THE VARIOUS STATES OF THE UNION.

[The states are in alphabetical order.]

ALABAMA.

Returns are made to a State Board of the whole length of track, and of the length in each county and town; also of the value of the road and of all real estate used for operating it, and of the rolling stock. The Board finds the value of each mile of road, and notifies the assessors of counties and towns of the amount assessable by them, depending on the number of miles in their limits. They add the value of other real estate and of tools and machinery, and assess on the aggregate as on the estate of an individual.

The value of real estate is to be assessed as if owned in fee simple, without any deductions for mortgages or other cause. And the value of the whole road is never to be estimated as less than a principal sum, which, at 8 per cent., would produce the net earnings, meaning thereby the gross earnings less the running expenses.

There is no tax on receipts and none on individual holders of stock. From the State Board there is no appeal. The

penalty for not making returns is double taxation, obtained by adding one hundred per cent. to the assessable value as found.

ARKANSAS.

The county clerks of the several counties through which a railroad runs are constituted a Board to annually "ascertain the value of all personal property, moneys and credits of such company, and appraise the same at its true value in money."

They may require detailed statements under oath, and in ascertaining values, road-bed, stations and other realty necessary to the daily running operations of the road are to be estimated as personal property.

The value thus ascertained is then apportioned by this Board among the several counties through which the road runs, so that "to each county, and to each city, incorporated village, township and district, or part thereof therein, shall be so apportioned as shall equalize the relative value of the real estate, structures and stationary personal property of such company therein in proportion to the whole value of the real estate, structures and stationary personal property of such railroad company in this state; and so that the rolling stock of such company shall be apportioned in the same proportion that the length of such road in said county bears to the entire length thereof in all said counties or county, and to each city, incorporated village, township and district, or any part thereof therein interested, the amount apportioned to each county; and it is hereby made the duty of the County Clerk to apportion the amount so found for his county to the cities, incorporated villages, townships, districts or parts thereof."

Where only a part of a railroad is in Arkansas, its entire value is appraised and divided in the proportion the length of road in Arkansas bears to its entire length, and "the principal sum for the use of the" road in Arkansas is determined accordingly.

In case of an alleged overvaluation, an appeal lies to the Board of Railroad Commissioners, which is authorized to reduce the valuation.

Neither the securities of the corporations in the hands of the holders thereof nor their gross or net receipts are taxed. The right to levy additional tax on realty is in litigation. The fundamental principle is that of a property tax levied upon an arbitrary valuation and paid directly by the corporation.

CALIFORNIA.

In this state before the adoption of the new constitution (1879), only material and visible property was taxed, excluding all franchises, stocks, bonds, etc. It was also assessed at full cash value.

Railroad corporations were taxed as holders of realty on the land occupied as right of way, with the track and all structures thereon as a whole, at a certain sum per mile. On land not used as track, railroads were taxed, like other property-holders, on "the cash value of real estate," and separately on the "cash value of improvements" thereon. The personal property was assessed wherever it was found, except the rolling stock, which was assessed in each county through which the road ran in proportion to the length of road in each county. As above stated, no tax was laid on franchise or receipts, or on the stock of individuals. The assessment of each county was sent to the Board of Supervisors, acting as a Board of Equalization, hearing complaints and making valuations conform to actual cash value. Thence it went through the County Auditor to the State Board of Equalization, consisting of the Governor and two other officials, who levied a sufficient rate to raise the amount directed by legislation.

Each county board having received the state rate, collected the state tax, and both fixed the county rate and collected it. Municipal authorities assessed and collected taxes on property found within each town or city.

Under the new constitution the property to be taxed includes credits, bonds, stocks, dues and franchises. A state board of equalization and county boards are provided for. The state board is to assess the franchises, roadway, road-bed, rails and rolling stock of all railroads running through more than one county at their actual value, and apportion it to each county and municipality in proportion to the length of road therein.

All other property is assessed in the place in which it is situated.

COLORADO.

The State Board finds the value of all property, real and personal, used for railroad purposes, considering all the circumstances of the road; and transmits to the county board for assessment the amount assessable by them in proportion to the number of miles of main track in each county.

CONNECTICUT.

Railroad companies are assessed one per cent. on such proportion of their stock and debt at market value less cash assets as the length of the road in the state bears to the whole length thereof, deducting the amount of local taxes paid on land not used for railroad purposes. The amount of municipal railroad bonds, of which the rails have been used for the road, is included as part of the debt on which taxes are assessed.

This is paid to the State Treasurer, and is in lieu of all taxes on the property or rights of the company.

Individuals are not taxed either on the stock or securities of the railroad company held by them. No taxes are levied on the rolling stock nor on the receipts. The only local taxation is on land not used for railroad purposes. The state tax of one (1) per cent. is assessed on the amount as returned by the railroads and as corrected by the State Board of Equalization, whose decision is final.

DELAWARE.

Railroad corporations are taxed on land just as other owners of land are taxed, unless exempt by charter. They are not taxed on personal property. Nor are they taxed on their franchise, unless by charter provisions. A yearly tax of $\frac{1}{2}$ of 1 per cent. is laid on the actual cash value. A tax is laid of 10 per cent. on net income, and when the road extends to other states, both these taxes are laid in proportion to the length within Delaware to the whole length of the road.

There is also a tax of 10 cents on each passenger carried within the state. Such a tax, as applied to persons brought into the state, or carried through it, or out of it, has been held to be unconstitutional by the Supreme Court of Delaware and of the United States. The law remains on the statute book, and is apparently enforced as to passengers only carried within the state.

An annual tax was laid of \$100 on each engine, \$25 on each passenger car, and \$10 on each freight car or truck used during the year by any railroad company incorporated by or doing business in the state. But the act was declared to be unconstitutional by Justice Strong, of the Supreme Court of the United States, and an appeal which was taken was not prosecuted.

The Philadelphia, Wilmington & Baltimore Railroad Company pays, by statute authority, a commutation of \$13,000, in lieu of the 10-cent tax on passengers; and other roads are permitted to commute in like manner. All the taxes, except that on land, are state taxes laid on amount returned by the company to the State Treasurer, or in case of failure

to return, computed by him. The tax on land is laid by local officers, with an appeal to the Levy Court.

FLORIDA.

Each road returns to the State Comptroller the length and value of the road, including the right of way and rolling stock. The Comptroller apportions the amount to each mile, and informs the county officers, who add to their county's share the other property in said county, and levy a tax on the aggregate as on the property of an individual.

GEORGIA.

When there is no charter exemption confining taxation to one-half per cent. of net income, the railroad companies are taxed, like individuals, on the value of road-bed, track, stations, rolling stock and all other property, real and personal. The rate has been $\frac{1}{2}$ per cent. No tax is laid on franchise or on stock in the hands of owners.

The question of charter exemption has long been in litigation; and the state has made many attempts to evade the constitutional protection given to roads by these contracts.

County taxes are levied at a per cent. on the state tax; and on the same valuation. In case of alleged excess in valuation, the parties select arbitrators, who agree on an umpire.

ILLINOIS.

Taxes are levied on railroad corporations as on other corporations and on individuals according to the value of their property.

The right of way, all tracks, stations and improvements on the right of way are assessed by the State Board of Equalization.

All other real estate is assessed as the land of individuals is. All personal property, except rolling stock, is assessed wherever it is found on May 1. If the value of the capital stock exceeds the value of the real and personal estate, the increase is assessed as capital stock. There is no franchise tax, and no tax on stock to the holders thereof; nor is there any tax on receipts. The value of rolling stock is fixed by the State Board, and distributed for taxation among the counties and municipalities, in proportion to the length of road therein.

The value of right of way, after being assessed by the State Board, is distributed in like manner, except that side and second tracks and buildings on the right of way are taxed where they are situated.

There is no appeal from the State Board. But the valuation fixed by local assessors may be revised by the town, and then by the County Board, whose decision is final.

INDIANA.

The law of taxation is the same as in Illinois, except in three particulars:

- (1). The whole capital stock is liable by law to be valued by the State Board, and distributed for taxation to the counties and towns in proportion to the length of road in each. But this is not done, and this part of the law is obsolete.
- (2). Railroad stock in the hands of individuals is taxed to them, as other stocks are.
- (3). There is no appeal from excessive valuation.

IOWA.

The general principle is equality of taxation for all property. Assessments are made on the value of the entire railroad at the estimated value of each mile, including in the estimate right of way, bridges, rolling stock, stations and all other property exclusively used for railroad purposes.

There is no franchise tax nor tax on receipts; and shares are taxed at their market value to the holders thereof.

KANSAS.

The general principle of taxation is assessment on all property at its value in money. "Railroad property" is assessed by a State Board, who estimate the value of the real estate connected with the right of way, and used in the daily operation of the road, including rails, ties, "franchises" and buildings. To this is added all moneys, credits and profits, all rolling stock, owned or used by the company. And the taxable value as ascertained by this addition is apportioned among the counties and municipalities in proportion to the length of road therein.

Real estate, not included in the above description, i. e., real estate not used in the daily operation of the road, is taxed, like the land of individuals, in the locality where it lies.

Railroads are not subject to a franchise tax, whatever the word "franchises" in the law quoted above may mean. Nor are they taxed on receipts, except as they swell the amount of money or profits on hand in March, when the valuation is made. Stock is not taxed to its holders. Local taxes are levied by local authorities on "railroad property," as returned to them by the State Board of Assessors. State taxes are apportioned by the State Board, and collected by the county treasurers. Real estate, not "railroad property," is assessed by the local authorities, with an appeal to the State Board, whose decision is final. Payment of taxes may be made by semi-annual installments. This method of assessment is said to have increased the amount on which taxes are levied by three million dollars over the old method of local assessment.

LOUISIANA.

In this state, the capital of all corporations is taxed, and property "over the capital" and property held in trust for business purposes for non-residents. Otherwise, there is no special provision.

MAINE.

No recognized general principle seems to govern the railroad taxation of this state. Railroad corporations are taxed for real estate in each town just as individuals are taxed for town purposes, but the track is not deemed to be real estate. They are not taxed for personal property. They are subject to a franchise tax of one and a half per cent. on the value of the franchise. This value is found by ascertaining the market value of the stock of each road and deducting the value of the property subject to local taxation. When roads extend beyond the state, the value is proportioned to the length of line within the state. This is done by the Governor and Council.

The State Treasurer credits each town according to the shares held therein; and the remainder is retained by the state.

Stock is not taxed to the owners thereof. No taxes are levied on receipts, nor on rolling stock.

Local taxes are laid by each town on real estate outside of the location, with an appeal to county commissioners in case of excessive valuation.

In case of overvaluation by the Governor and Council, there is no appeal.

MARYLAND.

In this state, all taxation of railroads for state purposes is on gross receipts. County and municipal taxes are laid on property, as the Declaration of Rights requires all taxes to be. Real estate is taxed for county and municipal purposes where it lies. Personal property is taxed where the home office is established, when the railroad company has not a capital divided into shares or has shares wholly or in part exempt from taxation. If there is no home office in the state, their personality is not taxed.

Holders of stock are taxed thereon; but, in computing the

value thereof, the assessed value of the real estate is deducted from the whole value of the capital stock, which is computed by the State Tax Commission. And an allowance is made on each shareholder's stock in proportion to this amount. The corporation pays the tax for each stockholder, and charges him with the amount.

The tax on gross receipts is one half of one per cent. paid directly to the State Treasurer.* Rolling stock is taxed at the home office, if that is within the state. Otherwise it is not taxed.

The Appeal Tax-Court in Baltimore and the county commissioners in the several counties correct valuations, and, under direction of the State Tax Commission and Attorney General, strike off such property as is not subject to taxation.

The law as above stated is modified in regard to some railroad companies by their charters, which are irrevocable except by consent.

MASSACHUSETTS.

The assessors of each place annually report to the Tax Commissioner the names of corporations, except banks, established or owning real estate therein, with an account of the real estate and machinery in said place, and its value and the amount at which it is assessed, and also the amount of taxes laid for the year in said place. Each corporation returns a list of stockholders, with the number of shares held by each, the amount of capital stock, the par value and market value thereof; and also the real estate, structures and machinery. Railroad companies, in addition, return the whole length of their lines, and the length lying without the state. Guardians, executors, etc., also make returns.

The Tax Commissioner ascertains the market value of the shares on May 1, preceding, and this is the taxable value of the franchise. The rate is determined by an apportionment of the whole amount to be raised by property taxes in the state during the year, as returned by the assessors, upon the aggregate valuation of all the towns and cities for the preceding year. From the valuation for railroad companies is deducted (1) an amount proportioned to that portion of their length lying beyond the state limits, (2) the value of real estate and machinery located and subject to local taxation within the state. An appeal is given, if the Tax Commissioner estimates the value of real estate and machinery at a less amount than the assessors have done.

Taxes are paid by the railroad corporations to the State Treasurer, who is nominally Tax Commissioner, and who, with the Auditor and one member of the Council, constitute a board of appeal for correction of all errors, and their decision is final. Stock is not taxed in the hands of the holders thereof; nor is there any franchise tax, except as above stated, nor any tax on receipts. The proportion of tax received corresponding with the amount of stock owned in each city or town is credited to that place.

Land to the width of five rods taken for the railroad is exempt from taxation; and so are all buildings for railroad purposes erected on such strip of land.

MICHIGAN.

In lieu of all taxes, except those on real estate not used for railroad purposes, a tax is laid of (2) two per cent. on gross earnings not exceeding \$2,000 per mile, and of (3) three per cent. on gross earnings exceeding that sum. There is, also, a tax of three per cent. on receipts from passengers carried in any palace or sleeping car, or any car for which an extra price is paid; and a tax of two per cent. on gross receipts derived from the leasing or hiring of cars by any "special," "fast," "colored," or other freight line.

Real estate not used for railroad purposes is subject to local taxes where it lies. There is no tax on the personal property of railroad companies, nor on franchise, nor on rolling stock. Nor is stock taxed in the hands of its owners. There is no apportionment of tax among counties or municipalities, the whole amount being paid to the state and devoted to special purposes.

The railroads incorporated before 1850 were subject to an annual tax of $\frac{1}{2}$ of one per cent. on their capital stock and all loans used in construction. The Lake Shore and the Michigan Central are still taxed in this way.

(TO BE CONTINUED.)

* Where a road lies partly in another state, it is taxed on gross receipts on the number of miles in the state, if the company returns the same; otherwise on such proportion of gross receipts as the number of miles within the state bears to its whole length.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:
Texas & Pacific, special meeting, at the office in Philadelphia, Jan. 20, at 1 p. m.

Dividends.

Dividends have been declared as follows:
Atchison, Topeka & Santa Fe, 3 per cent., payable Feb. 2. It is said that the company will pay quarterly hereafter.

Cleveland, Columbus, Cincinnati & Indianapolis, $\frac{2}{3}$ per cent., payable Feb. 2. This is the first dividend since 1875.
Terre Haute & Indianapolis, 4 per cent., semi-annual, payable Feb. 2, at the company's office in Terre Haute, or the Farmer's Loan & Trust Company in New York.

Mobile & Montgomery, $\frac{2}{3}$ per cent., semi-annual, payable Feb. 2. The stock of this company represents the bonds of the old company.

Oregon Railway & Navigation, 2 per cent., quarterly, payable Feb. 2.

Joint Executive Committee Meeting.

The next meeting of the Joint Executive Committee will be held in New York, Jan. 20. The subjects to be discussed are: 1. A revision of the "percentage table." 2. A revision of tariff to New England and interior points. 3. Tariff from the West to South Atlantic ports via Northern ports. 4. Adjustment of tariff to European ports via different Atlantic ports. 5. Changes in classification.

ELECTIONS AND APPOINTMENTS.

Baltimore & Chicago, Pennsylvania Division.—At the annual meeting in Pittsburgh, Jan. 12, the following were chosen: President, W. E. Schmetz; Directors, Wm. Van Kirk, J. G. Holmes, J. R. Straghan, Geo. A. Kelly, H. T. Reeves, W. P. Townsend, D. D. Miller, J. H. McCreery, Simon Beymer, Wm. McClelland, J. W. Forter.

Baltimore & Delta.—At the annual meeting in Belair, Md., Jan. 7, the following directors were chosen: Foulk Jones, James H. Watters, E. S. Rogers, Stevenson Archer, C. J. Moore, P. T. George, Thomas Armstrong, A. W. Bradford, James L. Sutton, Wm. Gilmor, Charles W. Hatter. The board elected James H. Watters President.

Boston & Lowell.—At the annual meeting in Boston, Jan. 7, the following directors were chosen: Josiah G. Abbott,

Wm. A. Burke, Thomas Talbot, Edwin Morey, T. Jefferson Coolidge, Hocom Hosford, Frederick E. Clark. Messrs. Hosford and Clark are new directors, the number having been increased from five to seven. Mr. Hosford was formerly Manager of this road and the Nashua & Lowell when they were worked together.

Brooklyn & Long Island City Elevated.—The officers of this new company are: Richard G. Phelps, President; Ludwig Semler, Vice-President; Mortimer C. Earl, Secretary; Job Corwin, Treasurer; J. R. Allaben, Attorney.

Burlington & Lamoille.—The following officers were recently reflected: Wm. B. Hatch, President; Nathaniel Parker, Vice-President, E. W. Peck, Secretary and Treasurer; D. C. Lindsley, General Manager.

Central Branch, Union Pacific.—Mr. A. A. Talmage, of the Missouri Pacific, has been made General Superintendent of this road also, and it will be known as the Central Branch Division of the Missouri Pacific.

Chester Valley.—At the annual meeting in Philadelphia, Jan. 12, the following were chosen: John F. Gilpin, President; F. B. Gowen, Coffin Colket, J. B. Lippincott, John Ashhurst, H. Pratt McKean, A. E. Borie, Wm. H. Holstein, directors. The road is leased to the Reading.

Chicago & Iowa.—In anticipation of the end of the receivership, the directors have chosen Joseph Rising, of Aurora, Ill., Treasurer, and W. H. Holcomb, General Superintendent. Mr. Holcomb has been Receiver for nearly three years. Mr. Rising, as Supervisor of the town of Aurora, has for some time represented its interests in the company. It owns 500 shares of stock.

Chicago, Burlington & Quincy.—As previously reported, Mr. H. B. Stone is appointed Superintendent of Motive Power and Machinery, in place of Mr. George Chalender, resigned.

Clarksville, Princeton & Red River Valley.—The officers of this new Tennessee Company are: J. B. Killebrew, President; J. J. Crusman, Secretary and Treasurer; E. F. Falconet, Chief Engineer.

Cleveland & Pittsburgh.—At the annual meeting in Cleveland, O., Jan. 7, the old board was reflected, as follows: August Belmont, Samuel J. Tilden, Charles Lanier, F. T. Walker, New York; B. F. Jones, J. N. McCullough, Pittsburgh; Thomas A. Scott, Wm. Bucknell, Philadelphia; E. M. Ferguson, Cincinnati; R. P. Ranney, James F. Clark, J. V. Painter, Cleveland.

Colorado Central.—At the annual meeting in Golden, Col., recently, the following directors were chosen: F. L. Ames, E. L. Berthoud, A. W. Bennett, S. H. H. Clark, F. M. Dexter, Sidney Dillon, A. A. Egbert, Jay Gould, W. A. H. Loveland, James Phillips, C. C. Welch. The board reflected W. A. H. Loveland, President; S. H. H. Clark, Vice-President; E. L. Berthoud, Secretary; Henry McFarland, Treasurer.

Columbus & Hocking Valley.—Mr. W. A. Mills, formerly General Freight and Ticket Agent, is General Freight Agent only, from Jan. 1. Mr. W. H. Harrison is appointed General Ticket Agent.

Columbus & Toledo.—Mr. W. H. Harrison is appointed General Ticket Agent from Jan. 1. Mr. W. A. Mills, heretofore General Freight and Ticket Agent, is now General Freight Agent only.

Columbus, Jeffersonville & Cincinnati.—At the annual meeting in Mt. Sterling, Jan. 5, the following directors were chosen: Wm. Monypenny, Wm. B. Hayden, Columbus, O.; Cyrus Seids, Jr., Shadeville, O.; J. A. Beckett, Commercial Point, O.; S. F. Rock, George Kious, Wm. McCafferty, Samuel McClintick, Mt. Sterling, O.; S. Willis Hays, Jeffersonville, O. The board elected Samuel McClintick President; J. A. Beckett, Vice-President; L. U. Stuart, Secretary and Auditor; John G. Looftbourrow, Treasurer.

Dayton & Union.—At the annual meeting in Dayton, O., Jan. 6, the following directors were chosen: James McDaniel, F. H. Short, J. H. Devereux, G. W. Rogers, Preserved Smith, H. H. Poppleton, R. M. Shoemaker, H. B. Hurlbut, Henry Lewis. The board elected James McDaniel, President; John L. Miller, Secretary and Auditor; G. W. Rogers, Treasurer; C. C. Gale, Superintendent.

Dayton, Corning & Toledo.—The officers of this company are: George W. Kneisly, President; J. O. Arnold, General Manager; C. C. Kneisly, Purchasing Agent. Offices in Dayton, Ohio.

Galveston, Harrisburg & San Antonio.—The following circular is dated Dec. 30, 1879: "Mr. Thomas Appleton has been appointed Superintendent of Bridges and Buildings, of the Eastern and Western divisions of this road, with headquarters at Schulenburg, Texas.

"All employees in his department will obey and respect his orders. Monthly reports of work done, material received and used in bridges and buildings, and on hand, will be made to him, on the first of each month, by foremen on each division."

Germanstown & Chestnut Hill.—At the annual meeting in Philadelphia, Jan. 12, the following were chosen: President, George B. Roberts; Directors, Josiah Bacon, A. J. Cassatt, G. Morris Dorrance, James P. Green, Strickland Kneass, N. P. Morrisbridge.

Iron Mountain & Helena.—The offices are at Helena, Ark., the officers being as follows: Wm. Bailey, President, General Manager and General Passenger Agent; Willis S. Webb, Vice-President; S. I. Clark, Secretary; T. M. Jacks, Treasurer; George W. Hered, General Land Commissioner.

Lawrence & Reading.—At the annual meeting in Reading, Pa., last week, the following directors were chosen: R. W. Shenk, A. H. Peacock, C. A. Bitner, John D. Skiles, W. L. Peiper, W. H. Kemble, John Keller, Amos Hollinger, Daniel Herr, George W. Hensel, F. Von A. Cabene, Henry Carpenter. The directors subsequently elected R. W. Shenk President and W. Leaman Secretary and Treasurer.

Lehigh & Eastern.—At the annual meeting in Philadelphia, Jan. 12, S. P. Kase was elected President, and Jonathan M. Roberts, John P. Lansing, H. B. Champion, Joseph C. Shuster, J. Reese Beals, Wm. H. Jones, Joseph Horner, James Shumway, Sidney H. Kerr, M. W. Kase, J. H. Kase, and B. J. Deboise, directors.

Longview & Sabine Valley.—At the annual meeting in Longview, Tex., Jan. 5, the following directors were chosen: Brad. Baraer, Eli Barner, S. N. Barner, Samuel Cundiff, George D. Harrison, J. H. McCauley, T. S. S. Young. The board elected Brad. Barner, President; George D. Harrison, Vice-President; Eli Barner, Secretary and Treasurer.

Louisville, New Albany & Chicago.—Mr. S. M. Brown has been appointed Superintendent, in place of J. S. Day, resigned.

Missouri, Iowa & Nebraska.—At the annual meeting in Centerville, Ia., Jan. 5, the following directors were chosen:

Wm. Bradley, F. M. Drake, J. A. Talbot, Centerville, Ia.; James Fitzhenry, Henry Hill, John N. Irwin, Keokuk, Ia.; John E. Walker, Waraw, Ill.; Wm. Gebhart, A. L. Hopkins, George Opydyke, C. A. Secor, B. E. Smith, New York; H. C. Thatcher, Boston. The new directors are Messrs. Bradley, Irwin, Opydyke and Thatcher, who succeed A. J. Baker, G. J. Forrest, F. Lovejoy and A. B. Stone. The board reflected F. M. Drake, President; Henry Hill, Vice-President and General Superintendent; James Fitzhenry, Secretary and Treasurer.

New York Elevated.—At the annual meeting in New York, Jan. 13, the following directors were chosen: Cyrus W. Field, David Dows, Ashbel H. Barnay, John H. Hall, Josiah M. Fiske, Jesse Hoyt, Alfred S. Barnes, John D. Mairs, Heber R. Bishop, Benjamin Brewster, Daniel A. Lindley, Edward M. Field, N. Gullford.

The board reflected Cyrus W. Field President; John D. Mair, Vice-President; James A. Cowing, Secretary and Treasurer; Thomas Gerehart, Assistant Secretary and Treasurer.

New York, New Haven & Hartford.—At the annual meeting in New Haven, Conn., Jan. 14, the old board was reflected, as follows: Wm. D. Bishop, Chester W. Chapin, Wilson G. Hunt, George N. Miller, C. M. Pond, E. M. Reed, Henry C. Robinson, Augustus Schell, E. H. Trowbridge, Wm. H. Vanderbilt, A. R. Van Nest, George W. Watrous, Nathaniel Wheeler.

North Pennsylvania.—At the annual meeting in Philadelphia, Jan. 12, the officers chosen were: President, Franklin A. Comly; Directors, John Jordan, Jr., William C. Ludwig, Edward C. Knight, Alfred Hunt, Thomas Smith, Ario Pardee, James H. Stevenson, Richard J. Dobbins, Charles A. Sparks, Edwin H. Filler, Thomas P. Stotesbury, Thomas Cochran. The road is leased to the Reading.

Northeast Pennsylvania.—At the annual meeting in Philadelphia, Jan. 12, this company elected Joshua Comly President, and the following directors: John Jordan, Jr., William C. Ludwig, Edward C. Knight, Alfred Hunt, Jas. H. Stevenson, Richard J. Dobbins, Charles A. Sparks, Franklin A. Comly, Thomas P. Stotesbury, C. J. Mitchell, Isaac Warner, Jr., I. Newton Evans. The road is worked by the Reading.

Northwestern Grand Trunk.—Mr. W. H. Pettibone has been appointed Assistant Superintendent. He was formerly on the Atchison, Topeka & Santa Fe.

Mr. K. Blackwell has been appointed Locomotive Superintendent. He was recently assistant on the Grand Trunk.

Ohio & Baltimore Short Line.—At the annual meeting in Pittsburgh, Jan. 12, the following officers were elected: President, J. B. Washington; Directors, W. W. Smith, Dr. Thomas McKennan, Wm. Workman, Henry M. Dougan, Wm. Keyser, T. Harrison Grant, John K. Cowen; Secretary, W. W. Smith; Treasurer, Wm. H. James; Auditor, W. P. Thelin; Chief Engineer, James L. Randolph.

Ohio Central.—Gen. P. Pense has been appointed General Superintendent. He was until recently on the Indianapolis & Western.

Ohio Falls Transfer.—The directors of this new company are: W. T. Beach, A. J. Hay, W. C. Hite, W. Hoar, Franklin C. Johnson, Logan C. Murray, John C. Stotsenburg.

Ontario & Pacific Junction.—At a recent meeting in Toronto, Ont., the following officers were chosen: President, J. D. Edgar, Toronto, Ont.; Vice-President, Frank Smith; Secretary, Andrew Green.

Perkiomen.—The officers of this company, whose road was formerly leased to the Philadelphia & Reading, but is now worked independently, are: A. H. Seipt, President; P. Super, Secretary; Wallace J. Boyd, Treasurer; James Boyd, Solicitor. Office in Norristown, Pa. The road is still run in connection with the Reading.

Philadelphia, Wilmington & Baltimore.—At the annual meeting in Wilmington, Del., Jan. 12, the old board was reflected, as follows: Enoch Pratt, Samuel M. Shoemaker, Thomas Whitridge, Baltimore; Jacob Tome, Fort Deposit, Md.; Joseph Bringham, Samuel Harlan, Jr., Charles Warner, Wilmington, Del.; Samuel M. Felton, Thurlow, Pa.; Isaac Hinkley, Wm. Sellers, Philadelphia; Charles P. Bowditch, Wm. Minot, Richard Olney, Robert H. Stevenson, Nathaniel Thayer, Boston. The board reflected Isaac Hinkley, President; Enoch Pratt, Vice-President; Alfred Horner, Secretary and Treasurer; Robert Craven, Assistant Treasurer.

Philadelphia & Reading.—Mr. Isaac A. Sweigard, Superintendent of the Germantown & Norristown Branch, is appointed Superintendent of the North Penn & Bound Brook Division, in place of A. H. Fracker, resigned. Ticket reports for this company should be addressed to John Heelner, First Auditor, Philadelphia. Car-tracers should be sent to A. J. Speese, Car-Recorder, Philadelphia.

At the annual meeting in Philadelphia, Jan. 12, the following were reflected: President, Franklin B. Gowen; Managers, H. Pratt McKean, Adolph E. Borie, J. B. Lippincott, John Ashhurst, Henry Lewis, I. V. Williamson; Secretary, David J. Brown; Treasurer, Samuel Bradford.

Pittsburgh & Lake Erie.—At the annual meeting in Pittsburgh, Jan. 12, the following officers were elected: President, James I. Bennett; Directors, Jacob Henrici, David Hostetter, John Reeves, M. W. Watson, James M. Bailey, Joshua Rhodes, Wm. M. Lyon, John F. Dravo, Jas. M. Schoonmaker, J. H. Devereux, John Newell, Jacob Painter. There had been some talk beforehand of a contest and a change of management, but at the meeting there was no opposition to the old board.

Pittsburgh, Cincinnati & St. Louis.—The appointment of Mr. Henry Monett, noted last week, as Assistant General Passenger and Ticket Agent, the Assistant having been accidentally omitted.

Pittsburgh, Virginia & Charleston.—At the annual meeting in Pittsburgh, Jan. 12, the following were chosen: President, J. N. DuBarry; Directors, Strickland Kneass, John Scott, Wm. J. Howard, Joseph Walton, M. B. Thompson, Geo. B. Roberts, Geo. V. Lawrence, D. A. Stewart. The road is leased to the Pennsylvania.

St. Louis, Hannibal & Keokuk.—Mr. W. W. Walker has been appointed Superintendent, with office in Hannibal, Mo., in place of E. M. Green, resigned.

St. Paul & Duluth.—Mr. R. S. Hair has been appointed Assistant General Ticket Agent, to date from Jan. 1.

Sioux City & Nebraska.—The officers of this new company are: Charles H. Bigelow, President; Russell Blakely, Vice-President; James H. Drake, Secretary; Horace Thompson, Treasurer.

Springfield Southern.—The officers of this company, successor to the Springfield, Jackson & Pomeroy, are: W. N. Whitely, President; H. L. Chapman, Vice-President; G. A. Barnes, Secretary; Amos Whitely, Treasurer; W. Thornburg, General Superintendent. Offices at Springfield, Ohio.

State University.—This company was organized at Chapel Hill, N. C., Jan. 8, by the election of the following directors: Hon. Kemp P. Battle, Julian S. Carr, Hon. Paul C. Cameron, Gen. R. F. Hoke, David McCauley.

Terre Haute & Indianapolis.—The new board has re-elected Wm. R. McKee, President; George F. Farrington, Secretary; W. S. Hone, Auditor; John E. Simpson, General Manager; Charles R. Pottle, Superintendent of Motive Power and Machinery; E. A. Ford, General Passenger Agent, and Horace W. Hubbard, General Freight Agent.

Union Pacific.—Mr. M. T. Dennis has been appointed New England Agent for this company and the Kansas Pacific, in place of D. W. Fuller, resigned. The office is removed from No. 228 to No. 290 Washington street, Boston.

Vicksburg, Shreveport & Pacific.—The officers of this company are: President, Edward Richardson, New Orleans; Secretary and Treasurer, Henry R. Jackson, Savannah; General Manager, J. W. Green, Monroe, La.; Cashier, Joseph F. McGuire, Monroe, La.; General Freight Agent, J. H. Milling, Monroe, La. The company is successor to the Vicksburg, Shreveport & Texas.

Wabash, St. Louis & Pacific.—The following appointments have been announced for the Western Division, which includes all lines west of the Mississippi: Assistant General Freight Agent, Thos. C. Doane, St. Louis; Master Mechanic, W. H. Selby, Moberly, Mo.; Master Car-Builder, C. S. Buck, Moberly, Mo.; Master of Bridges and Buildings, J. H. Travis, Moberly, Mo.; Superintendent of Telegraph, S. C. Mason, Moberly, Mo.; Superintendent St. Louis Division (St. Louis to Moberly and Ottumwa), George B. Parsell, Moberly, Mo.; Superintendent Kansas City Division (Moberly to Kansas City and St. Joseph), M. G. Cary, Kansas City, Mo.; Superintendent Council Bluffs & Omaha Division (Brunswick to Council Bluffs), J. W. Blanchard, Maryville, Mo. These are mainly re-appointments.

West Chester & Philadelphia.—At the annual meeting in Philadelphia, Jan. 12, the following were elected: President, J. Edward Farnum; Managers, Edward Hoopes, William H. Miller, Albert C. Roberts, Samuel Riddle, George Callaghan, Charles Fairbank, Lorenzo Beck, Samuel J. Sharpless, Marshall B. Hickman; Treasurer, Thomas H. Hall; Secretary, A. Lewis Smith; Superintendent, Henry K. Smith; Auditor, A. D. Sharpless.

PERSONAL.

—Mr. E. Gallup has declined the position of General Passenger Agent of the Lake Shore & Michigan Southern, preferring to remain with the Boston & Albany.

—Gen. W. J. Sewell, Superintendent of the West Jersey Railroad, has been elected President of the New Jersey State Senate for the third time.

—Mr. A. P. Gorman, President of the Chesapeake & Ohio Canal Company, is elected United States Senator from Maryland, for the term beginning March 4, 1881.

—Mr. J. C. McMullin, General Manager of the Chicago & Alton, received recently a very pleasant testimonial of personal esteem and friendship, in the form of a very handsome album, containing photographs of the President and directors of the company, and the heads of the different departments on the road.

—Mr. George Chalender resigned his position as Superintendent of Motive Power and Machinery of the Chicago, Burlington & Quincy road Jan. 1. In token of their regret at parting the officers and employees of the department gave Mr. Chalender a banquet on New Year's Day, at which he was presented with a handsome gold-headed cane. Mr. Chalender first went to the Chicago, Burlington & Quincy in 1853, but subsequently went to the Michigan Central as Master Mechanic, and afterward took the same position on the Burlington & Missouri River, holding it until the consolidation, when he was appointed to his late position.

TRAFFIC AND EARNINGS.

New York State Canals.

The following is a statement of the business of the New York state canals for the navigation season of 1879:

Amount of tolls received.....\$941,541.92
Total miles of boats cleared.....8,230,947
Total tons of freight cleared:

	Tons.	Per ct. of total.
Products of the forest.....	1,300,210	25.53
Animal products.....	1,897	0.04
Vegetable food.....	1,833,400	34.19
Other agricultural products.....	15,240	0.29
Manufactures.....	255,379	4.76
Merchandise.....	237,141	4.42
Other articles.....	1,610,163	30.77
Total.....	5,302,430	100.00

Products of the forest were, of course, chiefly various forms of lumber. Vegetable food included, as its chief items, 949,490 tons wheat, 621,182 tons corn, 106,354 tons barley and barley malt and 59,324 tons rye. Other articles include 971,055 tons coal, 314,181 tons iron ore and 107,561 tons stone, lime and clay.

Grain Movement.

For the week ending Jan. 3, receipts and shipments of grain of all kinds at the eight reporting Northwestern markets, and the receipts at the seven Atlantic ports have been, in bushels, for the past eight years:

Year.	Northwestern receipts.	Northwestern shipments.	Atlantic receipts.
1873.....	1,708,607	407,730	1,571,133
1874.....	2,278,736	1,123,078	1,543,855
1875.....	2,102,531	608,001	1,928,533
1876.....	1,712,902	1,059,356	1,412,388
1877.....	2,195,445	938,244	2,764,984
1878.....	1,452,008	1,012,056	2,147,844
1879.....	3,155,513	1,183,148	3,114,803
1880.....	4,232,089	1,096,747	3,114,803

The receipts at Northwestern markets for the last week are extraordinarily large—never equaled before in a winter week, though very nearly during the week ending Jan. 19, 1878, which was after a prolonged mud blockade, which had prevented the farmers' marketing their grain for some time.

The shipments of these markets, though exceeded before only in 1874 and 1879, and then not much, were comparatively very small; that is, the excess of receipts over shipments was about 1,150,000 bushels in 1874 and 2,000,000 in 1879, but 3,100,000 bushels in 1880, at which rate, of course, it does not take long to cause an enormous accumulation of stocks.

The receipts of Atlantic ports for the same week are a very little greater than for the previous week and much larger than in the corresponding week of any previous year. Last year, however, these receipts were considerably reduced by the snow blockade. The largeness of these receipts at a time when the shipments from lake points are but moderate indicates that the comparatively high rail rates have not restricted the movement; otherwise the grain would be

stored at inland stations just as it is at lake ports and, we may add, at Atlantic ports, where grain continues to accumulate because American prices are comparatively higher than European prices. Shipments by roads whose chief supply comes from the lake ports, however, are decidedly light, and the lines which reach the country further south get most of the grain at this time.

Of the receipts at Northwestern markets for the week, 51.2 per cent. went to Chicago, 18.1 to St. Louis, 10.1 to Toledo, 9 to Milwaukee, 6.6 to Peoria, 3.9 to Detroit, and 3.1 per cent. to Cleveland.

Of the receipts at Atlantic ports, New York had 42 per cent. (the largest for four weeks), Baltimore 24, Boston 12.2, Philadelphia 10.2, New Orleans 10, Portland 1.3 and Montreal 0.3 per cent. For the corresponding week last year New York received but half as much, the snow blockade preventing deliveries.

Railroad Earnings.

Earnings for various periods are given as follows:

Year ending Dec. 31:	1879.	1878.	Inc. or Dec.	P. c.
Atchison, Top. & Santa Fe.....	\$6,338,447	\$3,934,115	I.	\$2,404,332 61.1
Bur. & Cedar Rap. & No.....	1,534,949	1,527,067	I.	7,882 0.5
Central Pacific.....	17,127,149	17,907,451	D.	480,302 2.7
Ches. & Ohio.....	1,942,935	1,907,415	I.	35,520 1.9
Chicago & Alton.....	5,745,880	4,671,519	I.	1,074,361 22.9
Chi. & East. Ill.....	800,483	800,803	I.	320 0.04
Chi. Mil. & St. Paul.....	10,000,000	8,451,702	I.	1,548,298 18.4
Chi. & Northwest-ern.....	10,084,778	14,999,740	I.	1,085,038 7.5
Chi. St. Paul & Minn.....	1,100,900	942,345	I.	227,555 24.1
Grand Trunk.....	9,163,185	8,917,234	I.	245,951 2.8
Great Western.....	4,486,384	4,421,423	I.	64,961 1.5
Hannibal & St. Jo.....	1,930,528	2,045,450	D.	108,922 5.3
Illinois Central.....	5,513,200	5,500,576	D.	47,307 0.9
Iowa lines.....	1,403,434	1,538,558	D.	75,124 4.9
International & Gt. Northern.....	1,771,494	1,626,238	I.	145,256 8.9
Louisville & Nash-ville.....	5,948,542	5,355,100	I.	593,442 11.1
Missouri, Kansas & Texas.....	471,345	405,285	I.	66,110 16.3
Mobile & Ohio.....	3,343,373	2,983,100	I.	360,273 12.1
St. L. A. & T. H., Belleville line.....	2,128,331	1,909,973	I.	218,358 11.4
St. L. Iron Mt. & Southern.....	559,642	506,228	I.	53,414 10.6
St. Louis & San Francisco.....	5,301,873	4,514,321	I.	787,552 17.4
St. Paul & Sioux City.....	1,653,843	1,208,467	I.	445,376 36.9
Scioto Valley.....	1,133,802	1,100,889	I.	32,913 3.0
Toledo, Peoria & Warsaw.....	317,822	280,348	I.	37,474 13.4
Eleven months ending Nov. 30:	1,242,218	1,243,959	D.	1,741 0.1
At. Miss. & Ohio.....	\$1,546,285	\$1,575,216	D.	\$28,931 1.8
Net earnings.....	657,329	481,010	I.	176,319 36.6
Bur. & Cedar Rap. & No.....	1,358,745	1,402,991	D.	44,246 3.2
Net earnings.....	470,073	404,089	I.	65,984 16.3
Bur. & Mo. River.....	1,080,926	1,777,382	I.	203,544 11.5
Net earnings.....	1,364,128	1,223,761	I.	140,367 11.5
Ches. & Ohio.....	1,757,376	1,770,166	D.	13,090 0.7
Net earnings.....	579,902	299,652	I.	80,340 26.8
Frankfort & Komo.....	37,490	34,647	I.	2,843 8.2
Net earnings.....	20,835	15,083	I.	5,752 38.8
Int. & Gt. North.....	1,557,593	1,403,396	I.	154,197 11.0
Net earnings.....	503,262	545,131	D.	41,869 7.7
Louisville & Nash-ville.....	5,318,542	4,849,257	I.	469,285 9.7
Net earnings.....	2,236,350	1,919,939	I.	316,411 16.5
Mobile & Mont-gomery.....	620,827	590,612	I.	30,215 5.1
Net earnings.....	187,381	200,011	D.	12,730 6.0
Nash. Chatt. & St. L.....	1,615,224	1,482,130	I.	133,094 9.0
Net earnings.....	565,888	500,603	I.	65,285 13.0
N. Y. Lake Erie & W.....	15,110,876	13,928,479	I.	1,182,397 8.5
Net earnings.....	4,597,948	4,472,914	I.	125,034 2.8
St. L. Iron Mt. & So.....	4,637,198	4,046,130	I.	591,072 14.6
Net earnings.....	1,855,407	1,719,486	I.	135,921 7.9
Southern Minne-sota.....	583,278	587,341	D.	4,063 0.7
Net earnings.....	295,940	285,753	I.	10,227 3.6
Month of November:				
Bur. & Mo. River.....	\$187,224	\$223,705	D.	\$36,481 19.4
Carolina Central.....	52,761	42,655	I.	10,106 23.7
Net earnings.....	27,429	22,128	I.	5,301 24.0
Dakota Southern.....	12,020	23,086	D.	11,066 49.2
Net earnings.....	1,300	15,988	D.	14,688 1118.0
Galveston, Har. & San Antonio.....	135,716	146,406	D.	10,690 7.3
Month of December:				
Atchison, Topeka & Santa Fe.....	\$586,500	\$324,185	I.	\$262,315 80.9
Bur. & Cedar Rap. & No.....	176,204	124,670	I.	51,538 41.3
Central Pacific.....	1,432,918	1,432,918	D.	0 0.0
Ches. & Ohio.....	185,559	136,940	I.	48,619 35.5
Chi. & Alton.....	334,873	340,947	I.	193,929 58.9
Chi. & East. Ill.....	80,026	63,329	I.	16,697 20.4
Chi. Mil. & St. Paul.....	1,061,000	716,571	I.	344,429 48.1
Chi. & Northwest-ern.....	1,312,300	1,080,838	I.	231,462 21.4
Chi. St. P. & Minn.....	120,822	90,873	I.	29,949 24.7
Hannibal & St. Jo.....	197,115	178,507	I.	18,608 10.4
Ill. Cent. Ill. lines.....	478,778	465,234	I.	13,544 2.9
Iowa lines.....	128,877	118,327	I.	10,550 8.9
Int. & Gt. No.....	213,901	222,872	D.	8,971 4.0
Louisville & Nash-ville.....	690,000	505,843	I.	124,157 24.5
Minn. & St. Louis.....	52,383	29,867	I.	22,516 75.3
Mo. Kan. & Texas.....	380,028	242,568	I.	137,460 56.7
Mobile & Ohio.....	317,470	290,586	I.	26,884 9.3
St. L. A. & T. H., Main line.....	108,482	72,902	I.	35,580 48.7
St. L. A. & T. H., Belleville line.....	62,750	48,006	I.	14,744 29.1
St. L. Iron Mt. & So.....	604,675	408,195	I.	196,480 41.9
St. L. & San Fran. & St. Paul & Sioux City.....	212,866	102,636	I.	110,230 107.3
Scioto Valley.....	102,864	90,500	I.	6,364 6.6
Scioto Valley.....	30,379	20,132	I.	10,247 51.0
Tol. Peoria & War.	111,981	88,044	I.	23,937 54.4
First Week in January:				
Chicago & East. Illinois.....	\$14,077	\$13,791	I.	\$286 2.1
Hannibal & St. Jo.....	36,377	30,831	I.	5,546 18.0
St. L. Iron Mt. & So.....	127,800	70,234	I.	57,566 81.9
St. Paul & Sioux City.....	21,473	16,343	I.	5,130 31.5
Week ending Jan. 3:				
Grand Trunk.....	\$160,091	\$137,707	I.	\$22,314 16.9

Coal Movement.

Anthracite coal tonnages for the year ending Dec. 31 are reported as follows:

	1879.	1878.	Inc. or Dec.	P. c.
Phila. & Reading.....	6,862,567	4,816,430	I.	2,046,137 42.5
Northern Central.....	806,135	726,385	I.	139,750 19.2
Shamokin Div.....	411,467	302,751	I.	48,716 13.4
Summit Branch R. R.....	25,540	38,280	D.	12,740 33.3
Sunbury, Hazleton & Wilkesbarre.....	445,408	347,585	I.	97,823 28.2
Pennsylvania Canal.....	4,031,013	2,346,721	I.	1,684,292 71.8
Central of N. J., Lehigh Valley.....	4,369,610	3,243,871	I.	1,155,739 35.6
Penna. & New York.....	31,503	31,180	I.	410 1.3
Del., Lacka. & West.....	3,825,258	2,177,778	I.	1,647,480 75.6
Del. & Hudson Canal.....	3,412,053	2,137,202	I.	1,274,851 59.7
Pennsylvania Coal Co.....	1,372,759	929,170	I.	443,589 48.2
State Line & Sullivan.....	50,080	40,520	I.	9,560 23.6
Total.....	25,733,556	17,194,859	I.	8,538,697 49.7

Full official returns may change the above figures a little. Anthracite production reported for six years past has been as follows:

1879.....	25,733,556	1878.....	18,105,339
1878.....	17,194,859	1875.....	19,441,336
1877.....	20,134,739	1874.....	20,145,121

Broad Top coal tonnage over the Huntington & Broad Top road for the year was 141,541 tons.

Tyrone & Clearfield tonnage for the year was: 1879, 1,631,120; 1878, 1,298,425; increase, 332,695 tons, or 25.6 per cent.

The tonnage of the Barclay Railroad & Coal Company for the year was 343,891 tons.

Coke traffic for the year was as follows, in tons:

Allegheny Region, Pennsylvania Railroad.....	49,199
Penn and Westmoreland Region.....	93,801
Western Pennsylvania Railroad.....	93,279
Connellsville Region by Southwest Penn. R. R.....	886,581
Baltimore & Ohio R. R., partly estimated.....	200,000
Pittsburgh Region, by Pennsylvania R. R.....	275,547
Pittsburgh Region, by river, estimated.....	200,000
Total.....	1,798,407

Shipments out of the pools on the Monongahela River above Pittsburgh in 1879 were, in bushels: Coal, 62,015,300; coke, 3,572,700; total, 65,588,000; total, 1878, 76,825,255; decrease, 11,278,255 bushels, or 14.6 per cent., due to low water and light river trade below Pittsburgh.

Cincinnati Pool Shipments.

By the pool agreement on Cincinnati business, east-bound freight from that city is divided as follows: Pittsburgh, Cincinnati & St. Louis, 31 per cent.; Cleveland, Columbus, Cincinnati & Indianapolis, 27 per cent.; Marietta & Cincinnati, 19 per cent.; Atlantic & Great Western, 15 per cent.; Cincinnati, Hamilton & Dayton, 8 per cent. A statement of the shipments from Cincinnati proper, from June 9, 1879, at which date the pool went into effect, to January 1, 1880, shows that the Marietta & Cincinnati road is short on its percentage 2,102 tons, the Cincinnati, Hamilton & Dayton short 253 tons, the Atlantic & Great Western short 7,700 tons, the Cleveland, Columbus, Cincinnati & Indianapolis over 1,773 tons, and the Pittsburgh Cincinnati & St. Louis over 8,283 tons. On shipments from interior local points beyond Cincinnati, the Cincinnati, Hamilton & Dayton is short on its percentage 1,847 tons, the Atlantic & Great Western short 995 tons, the Cleveland, Columbus, Cincinnati & Indianapolis short 3,023 tons, the Pittsburgh, Cincinnati & St. Louis over 5,910 tons, the Marietta & Cincinnati over 956 tons.

Lake Superior Iron Ore.

The total ore and iron traffic of the Marquette, Houghton & Ontonagon road for the year ending Dec. 31 was as follows: Iron ore to docks for shipment by lake, tons.....554,232
Iron ore to furnaces.....30,835
Pig iron.....8,556
Total, tons.....593,623

For the same period the business of the Peninsula Division of the Chicago & North Western was as follows:

Iron ore to Escanaba docks, tons.....	794,528
Iron ore to furnaces.....	38,729
Quartz to Escanaba docks.....	5,643
Pig iron to Escanaba docks.....	11,339
Total, tons.....	849,239

The ore, stone and iron carried to Escanaba was all shipped by Lake.

RAILROAD LAW.

Company's Liability to Employees.

of small orders for ones, twos, threes, from other roads. The two last engines for the Central Branch, Union Pacific, are just about ready to be shipped. There have been about 20 in all furnished to this road, some of them reconstructed from the damaged engines returned to the works from a bankrupt Western road. There will be three or four engines of the Iron Mountain road completed the present month. The production is now about two locomotives a week, whereas before the panic, when about 1,700 hands were employed, locomotives were turned out at the rate of one a day. As soon as the newly reconstructed portion of the works shall be equipped, the force will be increased.—*Patterson (N. J.) Press.*

The Ohio & Mississippi shops at Vincennes, Ind., are to build several new locomotives.

The works of the Allegheny Car & Transportation Co., at Swissvale, Pa., have been sold and are to be started up soon. The Pittsburgh, Ft. Wayne & Chicago shops at Allegheny, Pa., last year built 14 passenger and 550 freight cars, besides several new engines. The cars now built are intended to carry 15 tons as an ordinary load.

The Danforth Locomotive Works, at Paterson, N. J., have a number of orders on hand and are very busy.

The Dickson Manufacturing Co., at Scranton, Pa., is building 25 consolidation engines, some for the Delaware, Lackawanna & Western and some for the Delaware & Hudson Canal Co., besides several smaller engines for different roads.

The Baldwin Locomotive Works, in Philadelphia, turned out 398 locomotives in 1879, of which 84 were sent to foreign countries. They have now a large number of orders on hand, including 32 for the Reading road, 27 for the New Jersey Central, 14 for the Northern Pacific, 9 for the Missouri Pacific, 16 for the St. Paul, Minneapolis & Manitoba, 10 for the Chicago, Milwaukee & St. Paul, 36 for the Denver & Rio Grande and 8 for the Denver, South Park & Pacific.

Billmeyer & Smalls, of York, Pa., have taken a contract to build 450 box, 60 stock, 100 coal and 250 flat cars for the Denver & Rio Grande road.

Iron and Manufacturing Notes.

The Chester Steel Castings Co. recently lengthened its main foundry building, added an L 60 by 80 ft., and put in larger furnaces and a new engine. The company is filling a number of orders from railroad companies and others. The works are in Chester, Pa.

There are now four blast furnaces at work in Alabama, Round Mountain and Cornwall in Cherokee County, Stone-wall, and Oxmoor Furnace at Birmingham. Two more are being built at Birmingham.

The Pittsburgh Steel Casting Co. is making a set of very large gear-wheels for a mill in Massachusetts.

The Lochiel Rolling Mill, at Harrisburg, Pa., will, it is reported, be fitted up as a steel rail mill, and started up on a contract for 20,000 tons.

The Chicago Steam Forge Works of Willard, Sons & Bell are running over-time, with orders for two months ahead.

Bridge Notes.

Clark Reeves & Co., of Phoenixville, Pa., recently completed three spans of 160 ft. each, iron bridge, for the Wash, St. Louis & Pacific road.

The Keystone Bridge Co., in Pittsburgh, is running its shops over-time, with many orders on hand. The works now employ 400 men.

Musings.

Brakemen are so called because they break to the passengers the news of arrival at each station. They usually break it so effectually that no one passenger gets more than a very small fragment of the name.

The brakeman of a passenger train looks forward to the time when he shall be conductor. The freight brakeman merely looks out for bridges.

The man who invented the steam whistle was noted for his intense hatred of the human race. And the human race returns that hatred ten-fold.

In the winter passenger cars are provided with stoves. These are used to melt the snow from the roof. As that is where all the heat goes, it is presumed that they are satisfactory in the results achieved.—*Boston Transcript.*

A New Snow-Plow.

The Rome, Watertown & Ogdensburg road has a new snow-plow, which is to be tried this winter, if there is any snow to try it on. It is somewhat vaguely described as follows:

"Extending from the track to the headlight, at the proper incline, is a smooth table, with side boards running half way up and from the top half way down is a divider to throw snow off upon the side. It is an exceedingly simple contrivance and only weighs one hundred and fifty pounds more than the common plow. It is eight feet wide and measures six feet and a half from the end to the front of the divider."

Rats in a Ticket Account.

A railroad agent in this city has just had a somewhat remarkable experience in balancing a ticket account. Some weeks ago when he drew up his balance sheet at the end of the month, he was astonished to find himself short about \$30. The accounts were checked and re-checked, but the mystery of the disappearance of the money could not be solved. As the office is at no time during the day or night without an occupant—one of the telegraph operators or other employees—it was considered impossible that the ticket case could have been robbed. The agent, after having spent twice the amount of money in worrying over the matter, was about to pay the deficit out of his own pocket, when one of the employees of the office discovered in a rat hole the skeleton of a rat and a twenty dollar note, and this explained the mystery. It seems that it is customary to place the money taken in for tickets at night on a shelf in the ticket case, till morning, when it is locked up in the agent's safe, and there it was exposed to the ravages of the mice. It is thought by sending the pieces of the bill to the Treasury Department, new notes will be exchanged for them, and thus nothing will be lost.—*Charlotte (N. C.) Observer.*

Maxims for Travelers.

Don't you love to read the maxims which some wise man writes for the newspapers, useful rules, which are intended to save human life and alleviate human suffering? There is always so much practical common sense in them. Here is a batch, for instance:

"For dust in the eyes, avoid rubbing, and dash water in them."

This is especially useful when you are on the cars, and there isn't a drop of water in the country nearer than the engine or the next lake, forty-three miles behind you.

"Remove cinders with the point of a pencil."

We never saw that operation tried but once, and when it was successful. The man got out the cinder. He also put out his eye.

"For light burns, dip the part in cold water; if the skin is destroyed, cover with vasoline."

A beautiful spectacle a man would present who had gone up on a boiler excursion in a steamboat race, and had come down scalded just enough to make two coats of furniture varnish a necessity according to this admirable rule.

"Before passing through smoke, take a full breath and stoop low."

Just imagine now what a circus a smoking-car would present if every man who entered it kept that rule posted in his hat.—*Burlington Hawkeye.*

Tramps.

"I thought the tramps went south in the winter?"

"Some of 'em do, of course. But not so many as you think. Them fellows what's inclined to be sickly generally does. My lungs have been troubling me lately, and I've been thinking of starting for Florida myself. I don't know though; Southern railroads are awful hard to beat, and walking don't agree with me."

"How would you proceed to go south from Philadelphia?"

"I'd strike the captain of one of the freight boats going to Richmond for a free ride. If that wouldn't work I'd go on board when I had a chance, and hide myself among the freight. The P. & W. & B. road, running south from this city is decidedly 'N. G.' I've tried beating it once or twice, and always got kicked off between stations. The easiest railroad in the country to beat is the Michigan Central. I'll tell you what I done once. There's an express train leaves Detroit for Chicago at about 11 o'clock at night. It stops at Wayne Junction, Ann Arbor and Jackson. Between Jackson and Chicago, I think, it only stops twice. When the train pulled out of the Detroit depot, one March night, in 1877, I bounced the front of the express car. The doors of the express cars on those big through trains, you know, are always kept locked and barred. The messengers carry big sums of money, and are afraid of being robbed. One time some men did get on the train and sawed their way through the front door of the car, but the express messenger was up to snuff and shot one of the gang. The other two jumped from the train and escaped. Well, as I was saying, I got on the platform and rode through to Ann Arbor all right. My racket was to get off the train when we stopped, and keep on the side of the cars from the station until they started up. At Ann Arbor the brakemen must have seen me get on, for when we had pulled out about two miles the train stopped and I was put off. The moment they started I jumped on again. They saw me, and by the time the train had stopped the second time the conductor and brakemen were tearing mad."

"If you get on here again," the conductor said, "I'll break every bone in your body."

"I got on, though, all the same, but this time on the cow-catcher of the engine. As luck would have it, they didn't see me when I got on. At Jackson I went back to the express car again and rode clear through to the grand crossing at Chicago without being bothered. It's terrible wearing on a fellow's nerves, though, that kind of business."

"Engineers and firemen never give a fellow away. They're the best set of men all the way through I ever met. They always seem to like it when they see a tramp giving the conductor and brakemen trouble. Many's the time I've rode on engines when the fireman and engineer both knew it and wouldn't give it away."

"Another big ride I made in one night was from Toledo, Ohio, to Cincinnati. I left Toledo at about 10:30 on the night express of the Cincinnati, Hamilton & Dayton Railroad. It was so dark you could not see your hand before you and it was raining like fury. When the train pulled out I stood on the platform of the second car from the rear and just in front of the Pullman. The conductor passed through and said 'tickets.' I told him I was just going to ride out to the air-line junction, three miles from the city. He said, 'All right; be sure you get off there.' The moment the door of the sleeper closed after him I got on to the brake, reached up, caught hold of the top of each car at the end and pulled myself up. You know how a Pullman is made on top? Well, I just laid down flat, and holding on to the ventilators with my hands, I rode clear through to Dayton. There's a covered depot at that place and I knew it. When the train pulled in I stood very innocent-like on the platform and got off with the rest of the passengers. When it pulled out I managed to get on top again before the conductor came through. In the morning I was in Cincinnati. Tramps call that road one of the hardest in the country to work."—*Interview with Tramp in Philadelphia Press.*

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ered throughout with Brussels carpets, and is heated by hot air, which is conveyed in pipes to all parts of the car. In each end of the car a compartment is cut off and fitted up with easy chairs, sofas, etc., covered in morocco leather and affording very comfortable resting-places. In the rear compartment a desk for writing purposes occupies one side of the room, over which is suspended a large plate-glass mirror. Between these two compartments are the sleeping apartments, two in number, each containing a full-sized bedstead and being provided with marble-topped washstands, the water for lavatory purposes being supplied from a tank on the roof of the car. The space underneath the bedstead is occupied by drawers for the reception of linen, towels, etc. Besides the washstands in the bedrooms, an extra washstand has been put in, also a locker for conveying whatever may be necessary to supply the wants of

contract whereby the Chattanooga Company undertakes the entire management of the Central and its leased and controlled lines, paying over to its officers the amounts necessary to meet all obligations, pay dividends, etc. The lessee, or contractor, agrees to pay all interest and rental obligations of the Central, with dividends of 6 per cent. on its stock for seven years and 7 per cent. thereafter. Any surplus over fixed charges and dividends is to be used for improvements of road, grain elevators and docks at Savannah, and new steamships for the Ocean Steamship Company's lines as needed.

It is understood that Mr. Wm. M. Wadley, President of the Central, is to represent the interests of the combined roads on the seaboard, and manage their business in Savannah, and that he will have the management of the steamship lines.

The lease seems to meet with favor among the Central stockholders, and such expressions of opinion as have been made public are entirely in favor of it.

Central, of New Jersey.—In the matter of the suit between this company, the New Jersey West Line and the Trustees of the New Jersey State School Fund, to settle the title to certain lands at the Communipaw terminus of the Central, the Chancellor of New Jersey decides that the Trustees are not bound to defend both the suits brought, but that the company must elect within eight days whether it will proceed with the suit in the state court or that in the United States Circuit Court.

Chicago & Iowa.—By the agreement made some time ago, and sanctioned by the Court, this road was to be restored to the company January 1, and the foreclosure suits discontinued, provided the ability of the road to take care of itself had been proved in the meantime. Receiver Holcomb has put the road and equipment in good order, paid off some old claims, and last week made a report to the United States Circuit Court, of which the following is an abstract: That he has \$211,504.34 on hand; that the amount necessary to pay the accrued interest is \$148,500, which leaves a balance of \$63,004.34. He had operated the road for twenty-nine consecutive months, the net earnings being \$781,913.27, equal to \$26,932.63 per month, or \$323,950.32 per annum. The annual interest is \$140,000, leaving the net earnings per annum, over and above the interest charge, \$183,550.42. The taxes due amount to \$7,000, while there is in litigation \$25,000—tax on the capital stock.

The company also presented a petition to the Court, setting forth prior orders by the Court, and Mr. Holcomb's compliance therewith, and asking that the road be returned to the hands of its officers.

Judge Drummond said the report was of much importance and should be carefully examined; he therefore referred it to Masters in Chancery Bishop, and until he makes report, the road will continue in the hands of Receiver Holcomb. The Judge also recommended that the company reorganize itself for business, and be able, when the report is accepted, to show legally elected officers and have a treasurer under sufficient bonds.

Chicago & Northwestern.—This company proposes to build a large new passenger depot on Wells street in Chicago, and has asked the City Council to vacate a portion of North Water street to permit its plans to be carried out. It is said that work will be begun as soon as the Council shall pass the necessary ordinance, and that the depot will cost \$500,000.

Corpus Christi, San Diego & Rio Grande.—This company has concluded a contract with J. P. Nelson, who agrees to build the extension of the road from San Diego, Tex., westward to Los Ojuelos, a distance of 50 miles towards Laredo. The road is to be all built and equipped as soon as possible, the contractor to receive \$6,000 per mile in stock, and any local aid which may be voted.

Cumberland Valley.—This company made, on Jan. 1, a general reduction of local passenger fares to three cents per mile.

Denison & Pacific.—Contracts have been let for the extension of this road westward 50 miles from Gainesville, Tex., its present terminus. The road is now owned by the Missouri, Kansas & Texas.

Detroit, Hillsdale & Southwestern.—A controlling interest in this road has been sold to James M. Ashley, of Toledo, and John B. Alley, of Boston, who are the chief owners of the Toledo & Ann Arbor road. The road is 65 miles long, from Ypsilanti, Mich., southwest to Bankers on the Ft. Wayne & Jackson road, crossing the Toledo & Ann Arbor near Ypsilanti. It was formerly the Detroit, Hillsdale & Indiana, and came into possession of the present company through foreclosure.

Greenwich & Johnsonville.—This road having been recently sold under foreclosure of mortgage, the purchasers have reorganized as the Greenwich & Johnsonville Railway Company. The road is a short branch line, running from Johnsonville, N. Y., on the Troy & Boston road, northward 16 miles to Greenwich.

Holly Springs, Brownsville & Ohio.—When this road was built, the company bought 2½ miles of iron and its equipment from the Memphis & Raleigh road. The conditions of sale not having been complied with, the Memphis & Raleigh resold the iron and equipment to an Arkansas company, and the contractors recently began to remove their purchase. They were stopped, however, by a writ of replevin, and will have to prove their title in court.

Hudson & River Falls.—The stockholders of this company have voted to sell their road to the St. Paul & Sioux City Company, and have ratified the agreement made for that purpose. The road is 12 miles long, from River Falls, Wis., to Hudson, where it connects with the St. Paul, Stillwater & Taylor's Falls, lately bought by the St. Paul & Sioux City.

Illinois Coal Mine Railroad.—This company has filed articles of incorporation in Illinois for a railroad from Buckingham, in Kankakee County, to Turner Junction, and thence to Waukegan, with a branch or other connection to Chicago. The line from Buckingham to Waukegan would be nearly a semi-circle, with Chicago as a centre and a radius of about 35 miles. The incorporators are C. C. Bonney, R. P. Derickson, C. C. P. Holden, A. B. Mason and R. B. Mason.

Indianapolis, Decatur & Springfield.—The contractors for the grading of the extension to Indianapolis, Heustis and Irwin, have completed their work. It is stated that they received \$165,000 for the 51 miles, including some heavy work. There is still some track to be laid, all the ballasting to be done, water-tanks and station buildings to be put up, and much other work to be finished up.

Ithaca, Auburn & Western.—Ties have been bought for the extension of this road from Scipio Centre, N. Y., to Auburn, which was all graded some time ago.

Knoxville & Ohio.—It is reported that this company has concluded an agreement with the Louisville & Nashville, by which a connection between the two roads is to be made

at the Tennessee line, the Louisville & Nashville's Knoxville Branch to be extended from Livingston to meet this road.

Longview & Sabine Valley.—We are informed that this company purposes extending its road this winter and spring further southward into the lumber region which it serves. It is now 13 miles long, from Longview, Tex., southward to Camden.

Macon & Brunswick.—A dispatch from Macon, Ga., Jan. 13, says: "The Macon & Brunswick Railroad was leased here to-day. There was a very large attendance of railroad men and capitalists. The bidding opened by George H. Hazlehurst, of Chattanooga, bidding \$60,000. The bidders were Mr. Hazlehurst; H. L. Kimball of Atlanta; John H. James, of Atlanta; Hugh Carlisle, of Chattanooga; R. L. Mott, of Columbus, and J. M. Cowper, of Brunswick, Ga. One bid was made by C. K. Maddock, of Atlanta. Bidding was soon reduced to a contest between Messrs. Cowper and Kimball, and finally the road was knocked off to Mr. Cowper at a yearly rental of \$194,000, with the privilege of purchase. Mr. Cowper represented a company composed of New York, Macon, Brunswick and European capitalists, headed by Chauncey Vibbard, of New York. It is required that \$10,000 shall be paid to the Governor this evening. The company is prepared to comply with the terms of the lease act and will extend the road to Atlanta at once. Before the bidding opened R. K. Hines, attorney, read a notice of a six hundred thousand dollar claim of second-mortgage bonds against the road, and Mr. Kimball, the only strong contesting bidder, alleges he withdrew on instructions from New York backers, telegraphed during the sale, in response to inquiries from him after the notice was read. E. T. Faine read a notice claiming the road under the former attempt to lease it on Nov. 6."

Monadnock.—The Boston, Barre & Gardner has finally surrendered the lease of this road, and will make no further opposition to its transfer. The Chesire Railroad Company takes it under a lease for 10 years, paying \$12,000 a year for five years, and \$13,000 afterward. The road runs from Winchendon, Mass., to Peterboro, N. H., 17 miles.

Montgomery Southern.—This company has been organized to build a narrow-gauge road from Montgomery, Ala., southeast to Troy, with an extension through the southeastern part of Alabama to some point in Florida not yet decided on.

Muskegon Lake.—This company has been organized to build a short line from the lumber mills at Muskegon, Mich., to the main harbor on Lake Michigan. It is to have spurs connecting with the different mills.

Nevada Central.—This road is now completed to a point 60 miles southward from Battle Mountain, Nev., where it connects with the Central Pacific. Two-thirds of the road is now finished and track is being laid rapidly toward Austin.

New Haven & Northampton.—The contract for grading the extension from Northampton, Mass., to Bardwell's Ferry, on the Troy & Greenfield road, and the branch to Turner's Falls, has been let to Smith & Ripley, of Holyoke, Mass., the amount being not far from \$500,000.

New London Northern.—It is understood that the negotiations pending for some time past have ended in an agreement for the sale to this company of the Vermont & Massachusetts branch line from Miller's Falls, Mass., to Brattleboro, Vt., which it now works under lease. The price is not given, but is said to be \$600,000; the branch is 21 miles long. The agreement will be submitted to the stockholders of the two companies as soon as possible.

New York & Oswego Midland.—In the foreclosure suit the United States Circuit Court has directed the Master to make the necessary deed of the property to the purchasers.

It is said that the new company will be known as the New York, Ontario & Western. As already noted, it is to issue \$200,000 bonds to pay the expenses of reorganization; \$2,000,000 preferred stock in exchange for the Receiver's certificates, and \$8,000,000 common stock for the old first-mortgage bonds.

New York, New Haven & Hartford.—At the annual meeting held Jan. 14, the stockholders voted unanimously to ratify the pooling contract with the Boston & New York Air Line Company. This contract has been in operation some months; it provides that the gross earnings of the two roads shall be pooled, the Air Line to receive 6 per cent. of the joint earnings as its share. The Air Line confines itself to local business.

Pennsylvania.—The new ferry-house and passenger station at Cortlandt street, New York, is completed and is now in use. It is a convenient structure and a very great improvement on the worn-out building which it replaces.

Philadelphia & Reading.—At the annual meeting Jan. 12, the following resolutions were adopted:

"1. *Resolved*, That the report of the board of managers be and the same is hereby accepted and adopted, and that it, together with the accompanying reports and exhibits, be printed in pamphlet form for distribution to the stockholders.

"2. *Resolved*, That the action of the board of managers in taking leases of the North Pennsylvania Railroad and the Delaware & Bound Brook Railroad, and in guaranteeing the bonds of the Philadelphia, Newtown & New York Railroad Company, and in issuing bonds for the purchase of the Berks County Railroad, referred to in the annual report just read, be and is hereby ratified and approved.

"3. *Resolved*, That the thanks of the shareholders be hereby tendered to the President and board of managers for their faithful management of the interests of the company during the past year."

This company's November statement was not published until a day or two before the appearance of the annual report for the year ending with November. For the month it is as follows:

Gross receipts:	1879.	1878.
Railroad traffic.....	\$1,308,658	\$1,356,831
Canal traffic.....	122,535	219,430
Steam colliers.....	79,790	82,870
Richmond barges.....	20,221	18,764
Total R. R. Co.....	\$1,531,204	\$1,678,305
Coal & Iron Co.....	1,176,403	1,129,082
Total.....	\$2,707,607	\$2,807,477
Traffic:		
Passengers.....	675,089	471,192
Tons merchandise.....	480,982	371,142
Tons coal.....	777,635	803,808
Tons coal on colliers.....	53,426	48,834
Tons coal mined:		
By Coal & Iron Co.....	388,980	378,590
By tenants.....	132,321	144,055
Total.....	521,301	522,645

The statements are covered by those in the report, and are given here only that the record by months may be complete.

Port Oram & Rockaway.—Surveys are being made for a railroad from Port Oram, N. J., to Rockaway, about seven miles. The object is to reach some iron mines.

St. Paul & Duluth.—This company's statement for the half-year from June 1 to Nov. 30 is as follows:

Earnings of road.....	\$376,687.54
Expenses.....	248,171.38
Net earnings.....	\$128,516.16
Receipts of Land Department.....	\$89,096.27
Expenses.....	8,980.13
Total.....	\$208,632.30
Less preferred stock received in payment and canceled.....	64,357.10
Balance.....	\$144,275.20
Rent of Stillwater & St. Paul road.....	\$10,000.00
Taxes, insurance, interest, etc.....	17,568.65
Net surplus.....	\$116,706.55

The net earnings of the road and also the net surplus remaining were considerably greater than those for the entire year 1878-79, showing a great increase in business.

Sioux City & Nebraska.—This company has completed its organization and filed the necessary articles of incorporation. It is to be the St. Paul & Sioux City organization in Nebraska, and is to build a line from Sioux City, Ia., to Oakland, Neb., the present terminus of the Omaha & Northern Nebraska. That company and the Covington, Columbus & Black Hills will probably be consolidated with the new organization.

State University.—This company is now fully organized under the charter granted by the North Carolina Legislature. It has been decided to build the road on the line surveyed from Chapel Hill (where the State University of North Carolina is located) north by east to University Station on the North Carolina road. The distance is 12 miles, and on this line there is no heavy work.

Texas & Pacific.—This company is now offering through Woerishoffer & Co., of New York, \$5,000,000 first-mortgage bonds, the first installment of those to be issued for the El Paso Extension. The subscriptions were to close Jan. 15.

Toronto, Grey & Bruce.—The Toronto (Ont.) *Monetary Times* says: "The efforts made by this company to effect arrangements with its bondholders and the municipalities through which it passes, to secure the widening of its gauge, have met with partial success. Indeed, in the negotiations with English bondholders, who, as holders of a first mortgage, have the virtual control of the road, concessions were made which are as great as could well be expected. The bondholders, we are told, consent to forego the two years' interest at 6 per cent. now in arrears; to receive no interest for the year 1880; and to accept interest at the rate of 5 per cent. per annum after Jan. 1, 1881."

"This agreement relieves the company of \$240,000 of present debt, of \$120,000 for 1880, and lessens its burdens by \$20,000 a year thereafter, during the currency of the bonds. The cost of widening the gauge, etc., is estimated by Messrs. Shanly and Gzowski at \$800,000. It is hoped that sufficient will be obtained from the Ontario government and the various municipalities to amount, with the saving already mentioned, to the cost of the improvements. Nothing definite can be said, however, until the government has pronounced upon the application. If the expected grant be made, the company has the promise of leading men in each municipality that liberal assistance will be rendered. But failing that grant we infer that the scheme falls through."

"With respect to the statement in the *Globe* of Wednesday that the Grand Trunk had been promised running powers over the Toronto, Grey & Bruce in the event of its being widened, and that the latter would thereby become virtually a branch of and controlled by the former, we learn that no such arrangement has been either made or promised."

Union Pacific.—The Land Department reports for December sales of 22,261.54 acres for \$101,223.92, an average of \$3.46 per acre. The number of purchasers was 188, making an average of 155.65 acres to each. During the month 237 single and 100 round-trip land and emigrant tickets were taken up between Omaha and North Platte; 101 single and 69 round-trip land tickets were sold at Council Bluffs and Omaha.

Vicksburg, Shreveport & Pacific.—Surveys have been begun of the gap of 90 miles in this road between Monroe, La., and Shreveport, and it is announced that the company will begin work as soon as possible. Two large bridges are required over the Ouachita and Red rivers, and it is not thought probable that the line will be finished this year.

Western Oregon.—This company now operates the road formerly known as the Oregon Central. It is in operation from Portland, Or., to Independence, in Polk County, 76 miles, and has the track laid 24 miles further, forming at its southern terminus a junction with the Oregon & California road.

Western North Carolina.—A conference between the officers of this company and the East Tennessee, Virginia & Georgia was held in Raleigh, Jan. 10, to consider what could be done to hasten the completion of the road to the Tennessee line and a connection between the two roads.

ANNUAL REPORTS.

The following is an index to the reports of companies which have been reviewed in previous numbers of this volume of the *Railroad Gazette*:

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Philadelphia & Reading.

At the close of the fiscal year 1878 this company worked 799.4 miles of road, whereof 327 miles were owned, 416 leased and 56.4 controlled. During the year the line owned was increased by the North Penn connection, 1.8 miles, and the Baldwin Branch 2.2 miles, built, and the Reading & Lehigh road (previously leased), 41.2 miles, bought. The line leased was diminished by the surrender of the lease of the Perkiomen road, 38.6 miles, and increased by the lease of North Pennsylvania and branches, 108.3 miles, and the Delaware & Bound Brook, 30.7 miles, while near the end of the year the Philadelphia, Newtown & New York, 22 miles, was added to the roads controlled. Thus on Nov. 30, 1879, the close of the fiscal year, the company had 925.8 miles—372.2 miles owned, 475.2 miles leased and 78.4 miles controlled. The company also operates the Schuylkill Navigation, 108.2 miles, and the Susquehanna Canal, 45 miles, making 153.2 miles of water lines.

The following is a summary of President Gowen's report for the year ending Nov. 30, 1879, the reports of the other

officers with the tables of statistics not having been published as yet.

The earnings of the road for the year were as follows:

	1879.	1878.	Inc. or Dec.	P. c.
Travel.....	\$1,944,159	\$1,528,423	I.	\$415,736 30.6
Merchandise.....	3,827,446	2,690,766	I.	1,136,680 42.2
Coal.....	7,186,222	7,200,052	D.	20,730 0.3
Mail.....	44,944	41,685	I.	3,259 7.9
Miscellaneous.....	53,531	73,787	D.	20,256 27.5
Total.....	\$13,106,352	\$11,539,593	I.	\$1,566,759 13.6
Expenses.....	8,987,341	7,319,366	I.	1,667,975 22.8
Net earnings.....	\$4,119,011	\$4,220,227	D.	\$101,216 2.4
Per cent. of exps.....	68.6	63.4	I.	5.2 8.2

Expenses include taxes, renewal fund and rent of lateral roads.

The comparative traffic of the company for the last four years is shown by the following table:

	1876.	1877.	1878.	1879.
Passengers carried.....	10,936,157	6,674,889	6,376,413	7,908,648
Tons of coal, 2,240 lbs.....	5,595,207	7,255,318	5,909,140	8,147,580
Tons of merchandise, 2,000 lbs.....	2,493,277	2,837,648	2,757,839	4,177,976
Tons of company's materials, 2,000 lbs.....	482,232	313,981	412,110	631,753

Total tonnage of company (2,000 lbs.), including weight of passengers and company's materials, 10,236,326 11,833,826 10,383,317 14,673,139

The receipts and expenses per passenger and per ton carried, including in expenses all but interest on debt, were as follows, in cents:

	1879.	1878.	1877.	1876.
Receipt.....	25.2	17.7	23.9	17.5
Cost.....	17.7	7.5	17.5	6.4
Net.....	9.5	10.2	6.4	11.1
Per ton merchandise.....	91.6	56.8	35.0	97.6
Per ton coal, including tonnage of main line and branches only.....	112.6	81.9	30.7	148.9
Per ton coal, including tonnage of lateral roads.....	88.2	64.2	24.0	122.0

Including under expenses only actual working expenses, the average result was as follows:

	1879.	1878.	1877.	1876.
Receipt.....	25.2	17.7	23.9	17.5
Cost.....	12.3	12.9	13.2	10.7
Net.....	12.9	4.8	10.7	6.8
Per ton merchandise.....	91.6	37.1	97.6	49.4
Per ton coal, including tonnage of main line and branches only.....	112.6	57.8	54.8	148.9
Per ton coal, including tonnage of lateral roads.....	88.2	45.3	42.9	122.0

This shows a considerable gain in the net receipts per passenger, and per ton of merchandise, but a large falling off on coal.

As condensed from the transportation and income account, the result of the year's business may be stated as follows:

Receipts over cost of working the road.....	\$4,119,011.03
Add profit on steam coilers.....	358,863.33
Add credit balance of profit and loss account.....	42,751.98
Total.....	\$4,520,626.34

From which deduct:

Loss upon the business of the Schuylkill Canal.....	\$334,057.56
Less profit upon the business of the Schuylkill Canal Transportation Line.....	33,976.80
Net loss.....	\$300,080.76
Loss upon the business of the Susquehanna Canal.....	175,381.46
Total.....	475,462.22

Balance.....

Interest on bonded debt for the year.....	\$4,624,014.81
Interest for year on bonds and mortgages.....	118,427.25
Debit balance of interest account.....	366,143.79
Total.....	5,108,585.85

Debit balance for year ending Nov. 30, 1879, charged to profit and loss.....

The above debit balance results from charging full interest and rentals, irrespective of whether the same were payable in cash or in scrip, but of the amounts thus charged there was:

Payable in scrip.....	\$1,725,729.00
From which deduct loss as above.....	1,063,421.73
Leaving cash surplus earnings for the year.....	\$662,307.27

The cash deficit of the Coal & Iron Company is:

Total interest charges.....	\$1,054,985.99
Less payable in scrip.....	121,170.00
Losses for the year.....	933,815.99
From which deduct cash surplus of the Railroad Company.....	\$662,307.27
Leaving.....	\$271,508.72

representing the cash deficit of the operations of the two companies for the year, as against \$824,950.94 for the previous year, an increase of \$149,008.63.

The floating debt of both companies at the close of the year, including all outstanding wages certificates, was \$9,152,909.61, against \$6,419,008.38 at the close of the previous year, the latter sum not including the arrears of wages, for which, subsequent to the close of last year, wages certificates were issued.

The increase in the floating debt of.....

By cash deficit of the year's operations of both companies.....	\$970,959.57
By reduction of arrears of wages as follows:	
Amount due Nov. 30, 1878.....	\$1,137,934.04
Amount due Nov. 30, 1879.....	460,111.87
By new railroads and terminal facilities, including connections with the North Penn Railroad between Newtown and Tabor Junction; extension of branch at Harrisburg; cash deposit for purchase of Berks County Railroad; elevator wharf at Port Richmond, etc.....	368,465.98
By real estate, purchased.....	33,647.40
By new barges, etc., built.....	24,210.44
By collieries purchased and improvements made at furnaces, etc.....	330,976.93
By mortgage debts of Coal & Iron Company paid off.....	201,352.07
By increased amount of materials purchased and on hand.....	134,173.92
Total.....	\$2,741,608.48

In view of the greatly-improved condition of business the managers have not hesitated to increase the floating debt,

for the purchase, erection and completion of such facilities as seemed to them absolutely necessary, and without which the company would have been unable profitably to move the very large tonnage expected in the immediate future. Since the close of the fiscal year, however, an agreement has been made for an advance for one year of 70 per cent., or \$3,500,000, upon the \$5,000,000 of unissued general mortgage bonds of the company, coupled with an option to take the bonds at a price which will yield considerably more than a million dollars additional. A large proportion of this \$3,500,000 has already been received since the close of the fiscal year, and applied to the reduction of the floating debt, which at the close of business on Jan. 10, 1880, amounts to \$6,780,543 of bills payable and call loans to which must be added, \$635,015 for outstanding wages certificates, and \$301,416.98 for outstanding certificates for materials. If the option of taking the \$5,000,000 bonds is exercised, it will reduce the floating debt to about \$4,500,000, and while there can be but little doubt that the profits of the year 1880 will be sufficient to pay off this balance, it is also confidently believed that the increased earning power and improved credit of the company will, long before the expiration of the year, enable the managers to fund the floating debt upon terms more advantageous to the stockholders than the slower process of payment out of earnings.

The following statement shows the total amount of coupon scrip and income mortgage bonds outstanding:

Total amount to be issued.....	\$8,007,355.10
Amount issued to Nov. 30, 1879.....	\$7,526,768.10
Received with freight bonds and canceled.....	\$3,035
Converted into income bonds.....	2,218,000
.....	2,221,035.00

Scrip outstanding Nov. 30.....

During 1879 there was issued \$343,950.80 scrip and \$172,000 bonds. Of the outstanding scrip \$3,472,978.10 is on account of the debenture and guarantee loan; \$1,733,580 on account of the general mortgage loan, and \$99,180 for the Perkiomen mortgage guarantee.

The total amount of wages certificates issued has been \$4,537,090. Certificates to the amount of \$4,203,075 have been redeemed, leaving \$635,015 outstanding. It is believed that there will be no need of issuing any more of these certificates.

Of the various leased lines of railway, the Catawissa Railroad shows an increase of earnings of \$18,051.74; the Philadelphia, Germantown & Norristown Branch an increase of \$18,882.66 as compared with the previous year. The workings of the Reading & Columbia Railroad Company, including its leased line to Quarryville, show an increase of \$26,522.11. The Perkiomen lease was surrendered, and all ownership or control of that line given up at the time of the lease of the North Pennsylvania Railroad.

The Express Department shows a net profit for the year of \$59,098.82, as against \$52,335.78 for the prior year, an increase of \$6,763.04.

The steam-coilers' service shows a profit of \$358,863.33 for the year, as against \$232,435.58 for the previous year, an increase of \$126,427.75.

The canals show a loss, after payment of rents, of \$475,462.22, as against a loss of \$278,609.30 for the year 1878, the increased loss being partly accounted for by the low rates of coal transportation and partly by the extreme drought during the autumn, which for many weeks seriously interfered with the economical movement of traffic.

COAL & IRON COMPANY.

The income account of the Philadelphia & Reading Coal & Iron Company in a condensed form is as follows:

Rents, coal and ore royalties.....	\$297,509.97
Coal sales, 4,456,344 tons.....	9,892,029.94
Iron ore sales, 30,443 tons.....	94,134.44
Miscellaneous.....	29,123.91
Total.....	\$10,312,708.26

Expenses, including royalties, rents, taxes, etc.....

Less value of coal added to stock.....	\$11,331,043.32
.....	176,336.53
Total.....	11,507,379.85

Net loss for the year.....

Deduct credit balance of profit and loss.....	\$842,778.53
.....	143,327.68
Total.....	\$986,106.21

Loss charged to profit and loss.....

The total coal tonnage of the company's estates for the year was as follows:

	1879.	1878.	Increase.	P. c.
Mined by company.....	4,266,929	2,727,608	1,539,321	56.5
Mined by tenants.....	1,300,323	1,100,181	200,142	18.2
Total.....	5,567,252	3,827,789	1,739,463	45.5

The two chief items in the company's expenses were \$4,317,912.96 paid to the Railroad Company for tolls and transportation, and \$4,881,367.91 for mining coal. The actual cost of mining coal and delivering on cars for the year was \$1.143 per ton, as against \$1.237 in 1878, and \$1.039 in 1877.

Appended to the report is the usual annual table, showing the life of the iron rails, of the company's own manufacture, in the tracks of the railroad, and exhibiting the gratifying result that with an average annual tonnage of about ten millions of tons for the period embraced, but 22.7 per cent., or 38,949 tons, have been worn out and removed out of 171,182 tons of rails made and laid in the track during the last twelve years.

NEW LEASED LINES.

Concerning the lines leased and worked for a part of the year the report says:

"In the month of May last this company took possession, as lessees for 990 years, of the railroads, properties and plant of the North Pennsylvania Railroad Company and the Delaware & Bound Brook Railroad Company, under leases which provide for the payment of an annual rental equal to the fixed charges of the lessors, and annual dividends to their shareholders of 6 per cent. for the first two years, 7 per cent. for the next two years, and 8 per cent. for the remainder of the term. Full copies of the leases will be found in the appendix to this report.

"By these leases the company not only secures to itself the future growth of the valuable local and suburban traffic of the North Pennsylvania Railroad, which, in connection with improved terminal facilities in Philadelphia, is capable of great expansion, but obtains by the Bound Brook route, in connection with the Central Railroad of New Jersey, an independent and valuable line for the transportation of passengers, merchandise and coal to the city and harbor of New York. It was expected when the leases were taken that the first year's business might show a loss of from \$60,000 to \$100,000, and that after the coal traffic of the company was turned upon the new line, all subsequent years would show a profit. Instead of this loss, however, the actual loss in working both lines for the first seven months of the lease has been but \$6,708.15, after payment of all rentals, and against this loss there is to be credited a profit of \$91,796.07, represented by that amount of value of railway supplies and materials turned over to the company at the date of the leases without charge, but included in the items of the cost of working the roads as if paid for.

"In order to provide at once for the shipment of coal over

the new line, the wharves of the Delaware, Lackawanna & Western Railroad Company, at Elizabethport, formerly used by that company for its coal shipments over the Central Railroad of New Jersey, have been leased for three years and put in order, and the company is now prepared to transport direct, by its own cars and engines, to the harbor of New York, the large amount of coal tonnage which heretofore, at a cash cost of fully 85 cents per ton, had to be transported over lines of other companies. As the actual cost of moving this coal from Philadelphia to New York over the new line (the entire expenses of which are already provided for by its own business), cannot exceed 40 cents per ton, the difference of 45 cents per ton on a yearly tonnage of about a million tons, amounting to \$450,000 per annum, will represent the saving to the company by the acquisition of the new lines, in addition to the profit which will undoubtedly be made upon them from the traffic other than that of through coal to New York.

"During the year the Berks County Railroad, extending from a point below Reading through the latter city to Slatington, on the Lehigh, was sold under foreclosure of a mortgage debt of \$1,500,000, of which debt this company already held \$444,000 of bonds. The road was bought for the bondholders under an agreement by which it becomes the property of this company, in consideration of bonds dated May 1, 1878, payable in twenty years, bearing interest at the rate of 3, 4, 5, and 6 per cent. for the first, second, third, and subsequent years respectively, issued at the rate of \$600 for \$1,000 of the Berks County Railroad Company bonds, or \$900,000 for the entire \$1,500,000 of the latter. As will be seen by reference to the balance-sheet, \$586,800 of the new bonds have already been issued. An agreement has been entered into with the Wilmington & Northern Railroad Company, which formerly ran in connection with the Berks County Railroad, whereby the latter obtains entrance into Reading over either of the lines of this company, under traffic arrangements which, it is believed, will be advantageous to both companies.

"The line of the Philadelphia, Newtown & New York Railroad has been connected with the tracks of the North Pennsylvania Branch, and run in connection with the latter line since Nov. 20 last. The company has agreed to guarantee the only debt of the former company—\$700,000 of 6 per cent. mortgage bonds—upon receiving \$120,000 out of the \$700,000, and securing an effectual union of interests between the two lines. Whatever deficiency of earning power, if any there may be, in the line to earn its interest upon the debt, will be much more than made up by increase of earnings upon the lines of the Reading Company from the coal traffic to the new line."

OIL TRAFFIC.

"During the year the company has effectually secured a share of the oil traffic of the state. For many years this valuable business has been practically controlled by a corporation known as the Standard Oil Company, which, without owning any very large share of the production of oil, has practically enjoyed a monopoly of the business by reason of its ownership or control of nearly all the refineries of the country where the crude petroleum is converted into refined oil. When it is considered that it takes but about four months to erect a refinery, and that it is neither a difficult nor a costly matter for any producer of oil to store his product pending the period of the erection of a refining establishment, it seems marvelous that upon so slight a foundation as the ownership of refineries any firm or company should have secured so firm a hold upon the oil business; but as the Standard Oil Company has heretofore enjoyed the benefit of a special rate from the trunk lines much lower than it was possible for any other shipper to obtain, it was enabled to make, as against any competitor shipping over the trunk lines, such an increased profit out of refining, as effectually to secure the business in its own hands. It is true that this special rate was given on account of the large shipments of the Standard Oil Company, but as the latter was only able to secure the large shipments by reason of its special rates, the wisdom of making the discrimination may well be doubted. Within the last two or three years certain producers and shippers of oil, in order to reach the few refineries in the neighborhood of New York which yet remained independent of the Standard Oil Company, associated themselves as the Equitable Pipe-Line Company, laid a local pipe to connect with a railway terminating at Buffalo, and shipped from the latter place crude petroleum in canal barges, via the Erie Canal, to the waters of New York Bay. As this avenue of transportation was closed during the winter, it proved ineffectual as a source of permanent supply, and in order to secure an outlet for the entire year, as well to Philadelphia as to New York, certain gentlemen interested in the Equitable Pipe Line associated themselves into a limited company, as the Tidewater Pipe Line Company (Limited), and, having secured the right of way, laid a six-inch pipe-line a distance of over 100 miles from the Bradford oil region, in McKean County, Pa., to Williamsport, the terminus of the Catawissa Branch of this company, and a contract was entered into between the Tidewater Pipe-Line Company, this company and the Central Railroad Company of New Jersey, for the transportation of the oil to Philadelphia and New York by rail from Williamsport. This attempt of the producers of oil to secure an outlet independent of the Standard Oil Company and the trunk lines was at once resented by both interests affected, and from the date of the completion of the pipe line to the present, every effort has been made by some of the companies interested to convert the profitable business of the transportation of oil into a losing one. The trunk line rates on oil by rail have been so reduced as to yield at times but about one-sixth of a cent per ton per mile for its transportation, or about one-quarter of the actual cash cost, and for many months motive power which might have been most profitably employed in hauling remunerative traffic has been occupied with an enormous tonnage of oil which barely yielded the cost of the fuel for the engines. It is true that the Baltimore & Ohio Railroad Company has refused to participate in the low rates, or to carry oil at all at the prices paid to the other companies, and it is known that the New York Central Railroad Company has for some time been protesting against being compelled to move a traffic at losing rates; the other companies, however, continue to take the business, and its volume on the willing lines have doubtless been increased by the proportion from the Baltimore & Ohio Railroad; the original division of the traffic having been to the Pennsylvania Railroad Company, 44 per cent.; to the New York Central Railroad Company, 22½%; to the Erie Railroad Company, 22½%; and to the Baltimore & Ohio Railroad Company, 11 per cent. On behalf of the Standard Oil Company, an offer has been made to the Tidewater Pipe-Line Company to give to the latter as much oil as it could carry at very remunerative rates, provided all the oil was delivered to the Standard Oil Company for refining; this offer was, for manifest reasons, declined, and while the traffic of the Standard Oil Company is still being carried by some of the trunk lines at the low rates above referred to, the business of the Tidewater Pipe Line and the oil traffic on the Reading Railroad is yielding more than cost, and has grown from a product of 1,500 barrels of oil daily, in June, to 4,000 barrels, daily, in December, and in a few months, when the additional independent refineries now projected are completed, the daily capacity will be about

10,000 barrels of oil per day, all of which can be refined at establishments independent of the Standard Oil Company.

"When it is considered that the annual product of oil for Eastern shipments will be fully 12,000,000 of barrels; that in addition to this annual product there is stored in tanks in the oil region about 8,000,000 barrels awaiting transportation; that the producers of this oil are entirely willing to pay from \$1 to \$1.50 per barrel for its transportation, provided they have an assurance that all shippers will be treated alike; that the Tidewater Pipe Line could not take more than 3,000,000 barrels per annum, and that with the increased production there would be left for the trunk lines as much, if not more, oil to carry than they moved prior to the construction of the pipe line; that the difference in the rates of transportation between the ruinous ones now obtained and those which might be had for the asking amounts to the enormous sum of over ten millions of dollars per annum, equal in one case to from 5 to 6 per cent. upon the capital stock of the company interested, almost every fair-minded business man must be forced to the conclusion reached by the managers, that it cannot be long before the managers of the trunk lines will consent to receive the enormous profit from oil transportation which is daily within their reach, and discontinue the present ruinous rates, in which event a very large revenue will be realized by this company from the oil traffic thrown upon its lines by the Tidewater Pipe-Line Company, at Williamsport.

THE COAL TRADE.

"It is not, however, in oil alone that low rates of transportation have been persistently maintained during the year. The price of coal and the rates for carrying coal reached the lowest prices ever before known. In the face of a demand which freely took the entire production of the year, it is difficult to reconcile the continuance of low prices with any other hypothesis than that of a deliberate intention on the part of one or two of the companies interested in the production of anthracite to maintain low prices for the purpose of injuring the credit of the Reading Railroad Company.

"As early as February and March last this company made a proposition to the trade to advance prices, agreeing to maintain the advance for a given period alone, if the others would follow. Most of the companies were anxious and willing to do so, but two declined to make the advance, basing their declination upon the belief that there was, and would be, a large over-production of coal, and that they would not be able to sell their product even at the low prices. As the year advanced, the increase of demand showed plainly that the entire possible production would be taken, but notwithstanding this gratifying fact, every attempt to increase prices on the part of the Reading Railroad Company was met and treated as an act of hostility by some of those who, from their positions, should have been the first to welcome an advance of prices. There can be but little doubt that fully thirty millions of dollars have been sacrificed during the year, in order to gratify the desire of those who hoped by their course to injure the company.

"In addition to this cause, the low price of coal may also in some measure be attributed to another cause even more reprehensible, viz., that of stock-gambling on the part of those whose positions, enabled them to control the prices of coal, with a view of aiding their operations on the Stock Exchange. It is best in all such matters to speak plainly, and no feeling of mere courtesy to other companies should be sufficiently strong to prevent the fullest and most personal discussion of an evil which, like a cancer, is eating its way into the very vitals of corporate property in this country. It is almost impossible to conceive of any more heinous offense than that of making private fortunes on the Stock Exchange by depressing the prices of the products of a business corporation, and yet the fact that the price of coal has been purposely kept low, in order to depress the value of coal securities on the Stock Exchange, is shown by testimony that is overwhelming. It is no wonder, therefore, that under such circumstances the price of coal was kept low, and as it had not until late in the year been demonstrated that the demand was equal to the supply, the prices of one-quarter of the product effectually established the prices of the whole, and at one time during the year coal was sold on board vessels in Philadelphia at as low as \$2 per ton, and in the month of September an auction sale realized for broken coal, in New York, a price as low as \$1.97 per ton.

"Now, however, that it is practically demonstrated that the demand for the coming year will exceed the supply, the majority of the anthracite coal companies, who have been continuously striving to make money, can regard with indifference any attempt on the part of the minority to keep prices below a rate which will yield a fair profit to all concerned in the trade. It is but due to some of those who refused to advance prices to say, that their refusal was based upon an alleged belief that there would be a great over-production of coal, and that they argued that it was the sheerest folly to attempt to put up prices in the face of an annual production which they estimated at 30,000,000 tons, as against a demand of from 19,000,000 to 20,000,000. It was in vain to say to these gentlemen that the production of 1879 could not be more than about 26,000,000 tons, and that, with the revival of industries, the market might reasonably be expected to take the entire production, which would be but 25 per cent. more than that of 1873. All such suggestions were dismissed with the charitable condemnation of 'sanguine,' or 'rose-colored,' and even after their truth was demonstrated beyond all peradventure, the advocates of the restrictive policy continued to assert the correctness of their theory (like a man who, having said the horse was sixteen feet high, determined to stick to it), doubtless believing that it was of far greater importance that their predictions should be verified than that money should be made out of the coal trade.

"The entire production of 1879 was 26,100,000 tons. It is believed that the total possible production of 1880 can not be over 28,500,000, with a strong probability that it will be much less. As the increased demand for iron-works, and other kindred industries, will absorb from one-half to three-quarters of any possible increase of production over that of 1879, it is quite safe to dismiss all apprehension about the future of the trade. All the coal that can be mined and transported will be wanted; the prices fixed by any one company need have no influence on those asked by others, and the advocates of low prices and restricted production can injure none but themselves by putting their theories into practical operation.

"A great deal of discussion has recently taken place upon the subject of legislative interference with and control of railway corporations; committees of investigation have protracted, laborious and inquisitorial examinations, and legislators and Congressmen are puzzling their brains over rather Utopian plans for the regulation of the internal railway traffic of the country. It seems to be conceded on all hands that railways should earn money for their stockholders, and the expressed desire of those most anxious for reform is to provide some stringent code of laws under which this result can be accomplished in a manner most conducive to the public good. It is not believed that any benefit will result from the proposed legislative interference, but much good can be done by a healthful public sentiment finding its expression at shareholders' meetings, and rigorously condemning and

SOUTH CAROLINA RAILROADS IN 1879.

NAME OF ROAD.	Miles of road.	LIABILITIES.			TRAFFIC.		EARNINGS.				
		Stock.	Bonds.	Other debt.	Passengers carried.	Tons freight.	Gross earnings.	Expenses.	Net earnings.	Gross earnings per mile.	Net earnings per mile.
Atlanta & Charlotte Air Line.....	266.0	1,700,000	4,750,000		73,738	150,318	\$30,974	\$34,031	\$6,943	\$2,717	\$60
Cheraw & Darlington.....	40.0	322,100	271,000		10,349		52,568	20,037	26,531	1,314	693
Chester & Lenoir.....	40.8	369,500	117,100	23,000	8,411	6,133	32,027	20,425	12,202	650	245
Greenville & Columbia.....	196.5	1,515,677	2,162,763	631,231	54,045		404,745	309,103	95,382	2,060	486
Laurens.....	31.4				4,250		28,340	18,082	9,058	603	64.7
Port Royal & Augusta.....	112.0	1,500,000		46,313		79,392	232,133	223,976	\$1,843	1,983	100.0
Savannah & Charleston.....	106.3				59,418	48,783	216,373	188,953	27,420	2,039	258
South Carolina.....	243.0				112,010	242,363	1,015,962	678,711	336,551	4,178	1,385
Spartanburg, Union & Columbia.....	68.0	308,000		100,000	7,632		75,616	54,782	20,834	1,112	306
Wilmington, Columbia & Augusta.....	192.0	300,000	4,300,000	879,210	49,518	118,848	479,848	486,320	\$6,472	2,499	101.4

* Deficit.

These figures are from the first annual report of Gov. Milledge L. Bonham, Railroad Commissioner of South Carolina; the table includes all the roads which do not usually report otherwise. The reports are for the year ending Oct. 1, 1879.

The Savannah & Charleston and the South Carolina roads are in possession of receivers, pending foreclosure, and their reports contain no statement of liabilities.

The Chester & Lenoir is of 3-ft. gauge; the rest all of 5-ft. gauge. The Greenville & Columbia includes the Blue Ridge, 33 miles.

eradicating a system which has permitted the existence of the following evils:

"1. Unjust discrimination in rates in favor of particular shippers.

"2. Participation of officers or managers in the profits of any business transacted upon the lines of or with their respective companies.

"3. Stock-gambling by officers of corporations.

"If those principally interested in and injuriously affected by the existence of these evils properly use their undoubted power to remove them, there will be no necessity for legislative interference with the business of corporations.

"The bad result of the year's business just closed is due entirely to the low price of coal and the low rates of transportation. As compared with the last few years of depression, the average rates and price realized are shown in the following table:

Year.	Average rate of transportation per ton received by the Railroad Company.	Average price of coal received by the Coal & Iron Company at Schuylkill Haven.
1876.....	\$1.19.9	\$2.10.0
1877.....	1.63.4	1.30.8
1878.....	1.22.0	1.53.4
1879.....	0.88.2	1.33.5

"If the views of the future trade above given are correct, the period of low prices, either for transportation or for coal, has passed, and with the admitted fact of a present consumption and demand fully greater than the present power of production, the company will be enabled to realize fair prices for both transportation and for coal, and to earn large revenues for its shareholders, and readily to extricate itself from all financial difficulties.

"The following table shows the average receipts for transportation per ton of coal carried by the company during the seven years preceding those shown in the first list:

1869.....	\$1.58.0	1873.....	\$1.39.1
1870.....	1.40.3	1874.....	1.40.5
1871.....	1.38.1	1875.....	1.38.7
1872.....	1.21.5		

"The average rate for the seven years is \$1.39, and there is no reason whatever to doubt that with the improved prospects of the coal trade, and the greatly increased prosperity of the iron trade, the company will be able to realize in the present year a rate of transportation equal to the above average, although in the detailed estimates hereafter given \$1.35 per ton is assumed as the average gross receipts per ton of coal to be transported during the coming year. Roughly stated, the total net earnings of the railroad company for the past year were equal to 50 cents per ton for each ton of coal transported, and the losses of the Coal & Iron Company were 17 cents per ton for each ton mined. As the average price of coal at tide-water for 1880 will undoubtedly be \$1.50 per ton higher than it was in 1879, as the railroad company will move about 9,000,000 tons, and the Coal & Iron Company will mine nearly 5,000,000 tons, and as the increase of merchandise and passenger business may be relied upon to cover the increased expenses of working the road, the net profits of the company, after payment of all charges, except interest, may be expected to be:

For the Railroad Company.....	\$8,700,000
For the Coal & Iron Company.....	2,500,000
Deduct fixed charges and full sinking fund, say.....	11,200,000
Balance.....	\$4,300,000

"Equal to 12 per cent. on the share capital of the company.

"No account is taken in the above of profit on steam colliers and barges, or of loss on canals, as the former may be expected to cover the latter. With such an earning power properly established and demonstrated, the company will be able to command money upon the most reasonable terms, and to extricate itself from all financial difficulty by funding in some proper, permanent security all of such indebtedness as must be removed before cash dividends are resumed. Assuming that the option to take the \$5,000,000 of general mortgage bonds will be exercised during the next few months, there will remain the following indebtedness, which must be paid or funded before cash dividends are made:

Floating debt, say.....	\$4,500,000 00
Income mortgage bonds.....	2,218,000 00
Coupon scrip.....	3,305,733 10
	\$12,023,733 10

"To pay this out of net earnings would require from two to three years of prosperous times, and the shareholders would then be entitled to a distribution of share capital to represent the earnings devoted to the payment of indebtedness, first deducting therefrom the present debit balance of profit and loss of \$2,104,862.72. If, however, the improved credit of the company enables the managers to pay off the entire \$12,023,733.10 out of the proceeds of any new security, the issue of which would not increase the fixed charges of the company, they would consider it their duty to do so, first giving to each shareholder the option of taking his pro rata portion of such new issue, and in the event of the success of such a scheme (which may be considered highly probable), reasonable cash dividends could be resumed. The managers have reason to congratulate the shareholders upon the advent of better times, and to thank them for the great confidence shown in the management during the four years of adversity and disaster through which the company has safely passed.

"It is gratifying to be able to record the fact that during all the vicissitudes of the last few years, the great majority of the shareholders have held on to their property, and that

nearly three-quarters of the entire share capital of the company is still held by those who were shareholders at the date of the last dividend."

Pittsburgh & Lake Erie.

This company owns a line from Pittsburgh to Youngstown, O., 68 miles, with a branch from New Castle Junction to New Castle, Pa., 2.5 miles. The road was opened for freight traffic Feb. 10, and for passenger business Feb. 24, 1879, and the following statements are for the year ending Dec. 31, 1879.

The general account is as follows:

Stock (\$22.078 per mile).....	\$1,583,787.00
Bonds (\$28.369 per mile).....	2,000,000.00
Floating debt.....	751,550.35
Earnings used in construction.....	8,707.88
Total (\$61,618 per mile).....	\$4,344,045.23
Road and buildings.....	\$3,214,561.09
Equipment.....	520,000.00
Right of way and real estate.....	509,484.18
	4,344,045.23

The earnings of the road for the period during which it was in operation were as follows:

Passengers.....	\$84,386.00
Freight.....	244,754.41
Express, etc.....	6,508.51

Total (\$4,700.98 per mile).....	\$335,648.92
Expenses (52.59 per cent.).....	177,725.77

Net earnings (\$2,240.95 per mile).....	\$157,923.15
Interest on bonds and floating debt.....	134,768.38

Surplus for the year.....\$23,154.77

The road makes an excellent showing for a new line. General Manager Quincy's report says that the rapid increase in business compelled the purchase of a large amount of new equipment. An additional freight station has been erected in Pittsburgh, affording much better facilities for the prompt handling of freight. The report then gives a description of the freight and passenger stations along the line, giving every advantage to passengers and shippers. A large number of side tracks have been laid to manufacturing establishments, which are enumerated. These tracks aggregate a length of seven miles, 1,932 feet.

As the winter had been unusually severe, and the ground had become frozen to a great depth, the time of opening was not propitious. The spring rains and thaws were followed by slides in many of the cuts, and settlement of the embankments requiring large forces to keep the line open. Heavy slides occurred twice during the month of March, and Aug. 25, the line was visited by a terrific rain-storm washing the road bed in several places between Chartiers and Shouse-town, and carrying away the arch culvert at Porter's Hollow. The line was fully reopened on the following day, notwithstanding these interruptions. By constant vigilance no accidents or damage to trains occurred, and their regular trips were made, excepting three intervals of two and three days each, during the entire year.

As illustrating the extent of its connections, it is stated that the road interchanged cars with 131 different lines. The change of the Atlantic & Great Western to standard gauge will increase its business.

President Bennett's report says: "The rapid development of business along the line of the road, and the traffic at the main points, and that coming to our road from its connection with the Lake Shore and the Atlantic & Great Western, have far exceeded the most sanguine expectations of the projectors of the road, and has only been limited by the ability of our company to furnish cars for its movement. In this connection, I wish to refer to the absolute importance of maintaining our present relations with these lines of railroad. By means of these lines our city and the county traversed by our road has direct access to all points of our land East and West, and it affords me pleasure to say that after ten months of experience we find these roads in full sympathy with our undertaking and ready at all times to aid us in handling our business. With these connections our road is and will be to the city of Pittsburgh all that was promised in its building, but break our relations with them and our city will at once feel the iron heel of discrimination. It is therefore all important to us that we maintain a friendly attitude toward these lines.

"In the building of the Pittsburgh & Lake Erie Railroad no promises were made to the stockholders of speedy returns on their stock, but we feel sure that when our report for this part of a year, when the road was crippled for want of sufficient equipment, and was limited in its capacity for answering the calls of its patrons, shows a balance of \$23,000 after paying expenses and interest on the bonded debt, no one will doubt but that with a judicious and economical management the road will at no distant day realize to the stockholders a return on their investment.

"We wish here to emphasize to you the necessity and importance of maintaining your road as an independent line of railroad. We have endeavored to guard against any possible contingency by the formation of our trust stock deed. We believe it to be a perfect defence against attacks from without, and regardless of what may be said, we believe it is a complete safeguard, and that our line will be through the coming years held in the interest of our city. It can only be overcome by sale of the road on the mortgage of the bondholders, and I feel safe in pledging to you that this consummation will never be reached as long as the business and industries of the city of Pittsburgh take the hearty interest in our welfare that they do at this time. We have tried to deserve it, and shall do even more in the future."